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[OFFICIAL NOTICE.]

Novelty Advertising Department, Ohio Gas Light Association.

OHIO GAS LIGHT ASSOCIATION,
OFFICE OF SECRETARY, DELAWARE, O.,
December 12, 1903.

The Editor of the Novelty Advertising Department, Mr. B. W. Perkins, of South Bend, Ind., desires to announce that his department is now open for contributions to be presented at the Twentieth Annual Meeting, which will be held in Cleveland, March 16th, 17th and 18th.

This department is one of the most attractive features of the convention. Its success, however, depends largely upon the active co-operation of the members. It is, therefore, earnestly hoped that the fraternity will not be backward in sending advertising schemes to Mr. Perkins.

T. C. JONES, Secretary.

BRIEFLY TOLD.

DEATH OF MR. ELIAS T. WATKINS.—"R. W. S.," writing from Chicago, under date of the 17th inst., forwards the following history of the life of Mr. Elias T. Watkins, who a quarter of a century ago was a prominent and peculiar figure in the gas industry, through his queer management of the old Chicago Gas Light and Coke Company: "Death reduced the narrowing lists of ths early settlers of Chicago, yesterday afternoon, the 16th inst., when Elias T. Watkins, an octogenarian prominent in the village days as builder and owner of the first horse car line on North Clark street, nucleus of the Union Traction Company, died suddenly after a fall at his home, 148 Rush street. A slip on a stairway resulting in a fractured skull is given as the cause of death. The aged man became unconscious after the fall, and although Dr. C. F. Ely was present 15 minutes later, he passed away without regaining his senses. For 40 years Mr. Watkins exerted a powerful influence in the commercial and business life of Chicago, being known up to a decade ago as the power behind the throne in a variety of enterprises. He was born at Milton-on-the-Hudson, New York, in 1816, and came to Chicago in 1848, at once engaging in the mercantile business. A few years later he built the old plank road from the 'Bull's Head,' now the corner of Ogden avenue and Madison street, to Naperville, and in 1859 became one of the earliest traction magnates by forming, with General John B. Turner, the North Chicago City Railway Company. Twenty-two horses, two miles of track and a half-dozen omnibuslike cars formed the equipment. Later his stock in the road was absorbed by the Turner interests. Soon after the great fire Mr. Watkins turned his attention in the direction of another public utility, and became President of the Chicago Gas Light and Coke Company. He remained the moving spirit of the Company through all the great fights for control of the gas supply of the city, until the formation of the present combination in the early '80s, when he terminated his interests in gas. In 1888 Mr. Watkins, who for 20 years had been recognized as an important and influential man of business, was made President of the Chicago Edison Company, a position which he resigned a year later to take a European trip. Soon after the organization of the Merchants Loan and Trust Company Mr. Watkins was elected a Director, remaining continuously on the board until his death. Sixty-one years ago Mr. Watkins was married to Angeline E. Downs, at Brockport, N. Y., and the union remained unbroken until Oct. 24, when Mrs. Watkins died. There were no children, and the nearest of kin are numerous nephews and nieces scattered throughout the country, of whom Elias M. Watkins, of Chicago, Secretary and Treasurer of the American Strawboard Company is one. Interment will be at Graceland."

NOTES—

MR. JOHN MATHER, of Wayne, Pa., has succeeded Mr. W. E. Barrett as General Manager of the Merion and Radnor (Pa.) Gas and Electric Company.

THE hearing on the petition of the Northampton (Mass.) Gas Light Company, for the right to increase its capital stock in the sum of $25,000, was held before the Board of Gas and Electric Light Commissioners some days ago. The Company was represented by President Clark, Supt. Crafts and Treasurer Bainster. No one appeared in opposition.

LIBRARY OF CONGRESS
DEC 28 1903

J. F., is informed that Mr. R. A. Guest, formerly in the office department of the Springfield (Ills.) Gas Company, is now Division Passenger Agent of the Chicago and Alton Railway, with headquarters in Springfield.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

A Fair Difference of Opinion, well Expressed.

ENGINEER'S OFFICE,
INDIANAPOLIS GAS COMPANY,
INDIANAPOLIS, IND., Dec. 22d, 1903.

To the Editors AMERICAN GAS LIGHT JOURNAL: Mr. Egner in his communication in your last issue raises an important question which is of great interest at the present moment, and which I think ought not to be passed over in silence. His long and successful experience in the manufacture of gas entitles his opinion to great respect. He advocates the making and selling of a low grade of gas of 500 B.T.U., or 13-candle power, on the plea that it is as suitable to burn in a Welsbach lamp as a gas containing 650 B.T.U., or say 17-candle power. Seeing that from 60 to 65 per cent. of the gas made in this country is used for heating purposes, I utterly fail to comprehend where the consumer can obtain any advantage in using a low grade gas; even if he pays less for it he must use more of it to perform the work required; for let it be understood—as per the Glasgow paper—that it is energy we are selling. Why should the selling of gas be an exception to the universal rule of buying by quality? I can purchase steam coal for $1.50 per ton; yet I find it cheaper to pay $2 per ton for it, because the $2 coal contains from 30 to 35 per cent. more of the energy I require. Therefore, it is the quality of the material we buy that governs the price. I use the calorific power of 650 B.T.U., because this is about the average power derived from Penna., and W. Va. gas coals without using an enricher, and, taking all things into consideration, is the most economical to make, and the most suitable to distribute in this country, except of course where the municipal standard demands a higher grade, and where an enricher has to be used. I know of nothing better or cheaper than carburetted water gas for that purpose. I even question Mr. Egner's statement that a low grade gas is the most suitable for the Welsbach lamp, as it is energy that is required in that lamp also, and it is simply a question of using a burner which will utilize the full energy of the richer gas.

Yours very truly, JAMES SOMERVILLE.

Sulphuric Acid Manufacture by the Contact Process.

G. Bodländer and K. Köppen, in the *Zeitschrift für Elektrochemie*, 1903, IX. (28), pp. 559-568, and (39), pp. 787-794, state that the production of sulphur trioxide is favored, or the complete conversion of dioxide into trioxide is approached, by increasing the oxygen concentration in the reversible reaction $2SO_2 + O_2 = 2SO_3$. The reaction speed is similarly influenced, but while the equilibrium depends only upon the absolute concentration, the reaction speed depends upon the absolute concentration; and increase of oxygen concentration may, by virtue of decreasing the absolute concentration of sulphur dioxide, retard the reaction more than it accelerates it by virtue of its own concentration. Dilution with excess of air retards the action at first, while it is rapid, but accelerates it greatly in the later stages, when it is slower; so that, on the whole, a conversion of 95 per cent. will be reached more rapidly with excess of air than when only the quantity theoretically required is present. Experiments with the theoretical mixture of sulphur dioxide and oxygen diluted with different proportions of nitrogen showed that the absolute speeds of reaction were diminished, but the relative speeds were unaltered; *i. e.*, the amount of conversion in 10 minutes, for example, bore in every case the same relation to the amount in 3 hours. These experiments showed, moreover, that the concentration of the sulphur trioxide formed also influenced the speed of reaction (retarding it as it increased), though the reaction at these low temperatures is not reversible, since the sulphur trioxide does not dissociate. Experiments showed also that excess of oxygen hastens the completion of the oxidation of the sulphur dioxide, so that although at first it causes a retardation, it effects, on the whole, an economy of time, and therefore a saving of space and contact substance. When platinum is used as the contact substance, the reaction speed is sufficiently great for carrying out the process at temperatures well below in fact that of incipient dissociation of sulphur trioxide, but with other contact substances of sufficient reaction speed can only be attained at temperatures at which the dissociation pressure of sulphur trioxide has notable values. The effect of pressure above atmospheric is favorable to the reaction, When there is excess oxygen in the gas the effect of increase of pressure is very considerable. Inasmuch as increase of pressure also raises the speed of reaction, the use of high pressures on an industrial scale seems to be a possibility for the future.

[ABSTRACT.—CONCLUDED FROM PAGE 966.]

PROCEEDINGS, THIRTY-FIRST ANNUAL MEETING AMERIGAN GAS LIGHT ASSOCIATION.

HELD IN DETROIT, MICH., OCTOBER 21, 22 AND 23, 1903.

SECOND DAY—MORNING SESSION.

A vote of thanks was tendered to Prof. White for his paper, after which an

EXECUTIVE SESSION

was ordered. It is to be presumed that the "session" was satisfactory and will be fruitful, but no inkling of that which was done thereat or therein was permitted to the abstractors.

The regular order was resumed by direction of the President, who asked Mr. W. Cullen Morris, of Long Island City, N. Y., to read his paper entitled,

NOTES ON THE OPERATION OF LARGE CARBURETTED WATER GAS SETS.

[For the text of the Morris paper, see JOURNAL, Nov. 2, p. 689.]

Discussion.

The President in inviting discussion remarked he understood that the Secretary had received a written communication from Mr. William E. McKay, of Boston, intended to be taken in connection with the debate on the Morris paper. He directed the Secretary to read the communication, which was as follows:

The statement by Mr. Morris of the results from large water gas sets has a particular interest because of the practical examination of the amount of steam used. For the efficient operation of Lowe apparatus an exact determination of the quantity of steam admitted to the generator, and of the "excess steam," or steam not decomposed by passing through the generator fuel, is of importance, whether the sets be large or small. In a paper read before this Association, October, 1890, by Mr. A. G. Glasgow, the author stated that the theory of fuel economy in the manufacture of water gas lay in a series of apothegms of which one was as follows: "Never admit an excess of steam." A comparison of the guaranteed capacity of a setting of given size and construction at the present time, with the capacity guaranteed some years ago, will show an increase in the capacity that may be partly attributed to a better knowledge of the steam supply. The accuracy of determination of temperatures of the generator fires may, perhaps, sometimes be doubted, but there is no difficulty in measuring the steam used; and if the amount of steam used per 1,000 cubic feet be set down, along with the daily items of coal and oil per 1,000, a relation between them will be evident. The three quantities to be determined are:

1. The amount of steam admitted to the generator per unit of time under known conditions of pressure and valve opening; (2) the amount of steam decomposed and present in the finished gas; (3) the amount of "excess steam;" *i.e.*, steam admitted to the generator and not decomposed, per 1,000 cubic feet of gas. When any two of these are known the third is a sum of difference. To determine the rate of flow of steam admitted to the generator, I have made satisfactory use of the following: The steam pipe is disconnected from the generator shell and immersed in a cask containing a known weight of water (the cask sets upon a portable scales) so that the steam pipe dips in the water by the number of inches corresponding to the gas pressure in the generator when and where the steam is admitted. The total length of steam piping and total number of turns correspond with the conditions of generator supply. The steam valve operated by the gas maker is then opened an observed number of turns, and the quantity of steam flowing into the cask per unit of time is read on the scale beam. Separate determinations are made of the upper and lower steam supplies to the generator. The rates thus found may be taken as *approximately* correct for conditions of actual generator use. The steam decomposed, and so present in the finished gas, is learned from an analysis of the gas, as stated by Mr. Morris. The water vapor present in the finished gas is indicated by the temperature. A direct measure of the "excess steam" used per 1,000 cubic feet of gas made is effected by collectiug all the condensation (tar and water) that occurs. If no water is introduced into the system between carburetter and holder, the water condensed and measured gives directly the data for the "excess steam" used in generator. This figure is the one most easily and accurately ascertained, and it furnishes a constant check upon the operation of the generators. I find that the "excess steam," as determined by actual measurement of collected condensation, is about 10 per cent. less than the amount that would be found by deducting the steam decomposed

per 1,000 from the steam admitted to generator as calculated from a calibrated valve opening. It is doubtless nearly correct to assume the amount of dissociated steam as about 15.4 or 15.5 pounds per 1,000 cubic feet of final gas. If this amount is deduced from the figures for the total steam per 1,000 cubic feet, as given in Mr. Morris's Table Number 1, the net "excess steam" per 1,000 cubic feet would appear thus, for the several tests reported: A, 4.34 pounds; B, 8.69; C, 9.37; D, 11.15; E, 12.44; F, 14.81; G, 8.53. The "costs per 1,000 cubic feet," as given in Mr. Morris's Table Number 2, appear to vary directly as the "excess steam," rising or falling as this latter rises or falls. Mr. Morris prevents an erroneous deduction from this similarity in variation by adding that "Other factors should enter into our consideration of these figures." There are so many elements in gas making, the variation of which affects the net result, that a statement of the best rate of flow for the generator steam is a statement of a temporary and mutable compromise. In 1891, with a type of water gas apparatus arranged only for making gas with up steam runs, I found the average "excess steam" was 16.2 pounds per 1,000 when we were getting the best net results from the set. With apparatus similar to that described by Mr. Morris, but with generators having an inside diameter of only 6 feet 6 inches, careful tests have recently been made when we were getting especially good fuel and oil results, and showed about thus:

Fuel.	Enricher.	Amt. Gas Averaged.	Excess Steam.
Anthracite.	Naphtha.	25,000,000 cubic feet.	13.5 pounds.
Anthracite.	Gas oil.	25,000,000 "	10.5 "
Anthracite.	Gas oil (heavy)	90,000,000 "	13.0 "

On the above tests the make per square foot of grate per hour ran from 1,500 to 1,800 cubic feet. I have usually observed that a marked variation in the rate of flow of steam has been followed by a variation in the CO_2, accompanying, however, a change in the temperature of the generator fires. It has been my experience that the temperature of the fire is directly affected by the amount of steam used; the excess steam carrying away from the generator fire much heat that later performed some useful work. Steam will carry heat from the generator and give it up in the carburetter and superheater, by an amount dependent upon the temperatures of the generator fire and of the gas leaving the superheater. Steam will carry to waste an amount of heat dependent upon the temperature of the carburetted gas leaving the superheater. Suppose that steam enters the generator at 331° F., and that the carburetted gas leaves the superheater at 1,450° F., then each pound of undecomposed steam will carry from the superheater about 537 B.T.U., and if the excess steam was as much as 14.8 pounds (case F, cited by Mr. Morris), the heat thus carried to waste would be nearly 8,000 B.T.U. per 1,000 cubic feet of gas made, or about one-twelfth of the energy required for the decomposition of the steam appearing in the finished gas. On the other hand, this steam has played an important part in protecting the enriching oil and in graduating its gasification, as well as in receiving between 2,000 and 2,500 B.T.U. from the generator fuel and transferring it to the enriching oils. The effect of the free steam in the carburetter is serviceable in other ways than in the prevention of over-cracking, to which Mr. Morris refers. There is some reason for supposing that the excess steam influences the amount of sulphur found in the gas at inlet to purifiers, both as to the amount of sulphur and as to the chemical form in which the sulphur is found. It is so difficult to keep all but one of the many circumstances of gas making at a standard, for the purpose of observing the effects of change in the one variable, that it is frequently difficult to ascribe an effect to the right cause, and the obscure relation between "excess steam" and the observed products in water gas making require careful work to make their definition other than suppositious. The "excess steam" immediately effects the condition of the generator fires for cleaning. Too little steam will fill the bottom of generator with clinker (especially with a high blast pressure) and too much steam will have a contrary, and equally objectionable, effect. On an 8-foot 6-inch setting, with an excess of 80 per cent. steam, it usually requires 25 to 35 minutes for the actual cleaning of an anthracite fire, cleaning once in about 12 hours, and the total time between the last run off, before the cleaning, and the first run on after the cleaning, is 60 to 70 minutes. The manner in which steam is introduced into the generator, whether for up or down runs, has an effect on the fire that appears in the average make of gas; it is easy to start a "dead-hole" if the steam is not admitted properly. One point on which I hope Mr. Morris will enlighten us is the following: The steam pressure he reports in the tests A to F reads 50 to 90 pounds; this pressure is, as I understand it, read on a gauge placed between the valve operated by the gas maker and a calibrated steam cock that is not ordinarily changed. Under these circumstances, even if he has constantly made use of an initial high pressure of steam at the boilers, yet if the pressure in the section of pipe between the steam valve and the steam cock runs as high as 90 pounds and as low as 50 pounds, why is it that a similar difference of 40 pounds boiler pressure in the steam supply has such a great effect on the gas making capacity and economy, when in each case the steam, as distributed over the bottom or top of the generator, shows a pressure of only a little more or less than ½ pound—15 to 25 inches on the water gauge? The temperature of steam at 90 pounds may be 331° F., and at 50 pounds 299° F., and the difference of "total heat" would account for about 10 B.T.U. per pound of steam entering the generator. If 24 pounds steam were used per 1,000, there would be a total difference of 240 B.T.U. between the heat carried into the generator per 1,000 by the steam under 90 pounds boiler pressure and the steam under 50 pounds pressure; yet with steam at 50 pounds boiler pressure the results from the generator fires would be wholly and absolutely unsatisfactory as compared with what can be done with steam of higher boiler pressure. I refer in each instance to steam that is dry but not superheated.

The President called on Mr. Norcross, who did not respond. He then called on Mr. Rollin Norris (Philadelphia), who answered for himself much as follows: Premising that he doubted if he could add anything of value except in a general way, he said that according to such data as he had the excess of steam came to nearly 100 per cent. He continued: "I am impressed with the importance of having some more accurate working method of controlling the amount of steam admitted, keeping it at the rate desired. Ordinarily the steam is admitted to the generator by the gas maker, who opens his steam valves a certain number of turns. The valve seat wears out and the gas maker continues to open the valve the given number of turns and, of course, the amount of steam must vary. With the renewal of the valve, maybe with one of another make, the steam supply again changes. He liked the suggestion made by Mr. Morris that a definite opening be established between the operating valve and the generators and that a definite pressure be maintained against this opening. He further wanted to inquire from Mr. Morris what advantage appeared in reversing the direction of the steam during a run? The ordinary method of operating reverse gear apparatus was, of course, to make so many up runs and so many down runs; usually two up runs and one down, or one up run then one down. In the experiments detailed the effect of reversing the valves is to produce one upward and one downward run each of one-half the ordinary length.

Mr. Morris does not seem to have replied, but Mr. Ed. H. Earnshaw, of Philadelphia, said that he doubted if he could add anything to what had been said by Mr. Morris on excessive amounts of steam. In regard to the tables by Bunte, as compared with those of Strache and Jahoda, it was his opinion that the discrepancy was less than Mr. Morris considered it to be. He said that in S. & J.'s first two experiments the steam flow was excessively small, and under these conditions carbon dioxide would be reduced to carbon monoxide in passing through the fire. While Dr. Bunte does not say so the inference is that in all cases he made use of the same rate of flow for his steam supply. If the first two Strache and Jahoda experiments be omitted, and one made use of those in which the temperature of the fire is given, the figures obtained were:

	Dr. B.	S. and J.
Fire temperature.....	954°	895°
Decomposed steam....	27.2 per cent.	34.1 per cent.
Carbonic acid.....	6.8 "	6.85 "

which difference is within the limit of the experimental error. Mr. Earnshaw also stated his agreement with Mr. Morris's views in regard to the temperature of the fire, which he believed to be of more importance in determining the composition of the gas than was the amount of steam sent in, within the limits of water gas practice.

Mr. Isaac N. Knapp (Ardmore, Pa.) said that the mechanical difficulty of distribution in a large set specially interested him. He said that in 11-foot sets there was usually some point in the brickwork particularly short lived, owing to the distribution of the steam, compelling great watchfulness unless disaster was wished for. If there were any point at which steam was in excess, or was not made in due proportion, the fault would be found in steam distribution. To obtain good results in a large set one must have an even distribution of the steam, so that when you open the fire door you may find that the fire has gone down uniformly, which would be indicated by ash and clinker being found evenly distributed on the grate surface. When this is the condition things are in trim for good results, but if the fire burns down unevenly good results are impossibilities.

The President asked for further remarks and Mr. T. D. Miller (New Orleans) took up the question of the coal used in the tests. Top clinker had troubled Mr. Miller. Many items were considered by Mr. Miller

as pertinent; the size of the coal; "was it broken or stove size?" and was it "hard or soft anthracite coal?" It was unfortunate that the knowledge of the temperature was not obtainable. According to the table given, at a temperature of 954°, carbon monoxide was 39.3 per cent., and the dioxide 21.9 per cent., but when the temperature is 610° C. (1,850° F.), the carbon monoxide reaches 49.7 per cent., and carbon dioxide falls to 1.5 per cent. This made the critical temperature about 1,000° C.; above this nothing is to be gained, below it much is lost. Below this temperature the carbon dioxide is rapidly increased, and it is but little diminished above it. Much of the serious discrepancy in the results obtained was no doubt due to the use of mistaken temperature limits.

The President then asked Mr. Morris to close the discussion. He first replied to Mr. McKay's written critique. The important point therein was the question as to the effect of boiler pressure, "Why is steam at 90 pounds pressure satisfactory, while steam at 50 pounds pressure (at the boiler) is not, when in either case the pressure in the generator is only about one-half pound?" Mr. Morris quoted Mr. McKay in extenso, but his questions conditions may be summarily put thus: Pressure, 90 pounds, temp., = 331° F.; pressure 50 pounds = 299° F.; difference in "total heat"=10 B. T. U. per pound of steam entering the generator. At the rate of 24 pounds steam per 1,000 cubic feet of gas the difference in the "total heat carried into the generator by the steam would be only 240 B. T. U. per 1,000 feet of gas, between the two conditions named. "Yet," Mr. McKay said, "with steam at 50 pounds pressure the result on the generators fires would be totally unsatisfactory as compared with those obtained when using steam at a higher temperature."

Mr. Morris said his data would not permit him to work to any such quantity as 240 B. T. U., and he believed that the difference in make would be inappreciable at the outlet, as the total difference per square foot only amounted to 7 per cent. between highest and lowest. In the early part of the paper a reference was made to a make of 1,800 cubic feet per square foot of the grate per hour, but the blast pressure was not given. This was unfortunate, as the make was largely controlled by the pressure of the blast. Mr. Morris noted an instance. "In one case, with 11-foot machines, we raised our pressure from 21 inches to 25 inches, increasing the make from 1,800,000 to 2,250,000 cubic feet per day; the increase being due to the short blow and greater number of runs per hour." He said: "I think that will explain that case." Mr. Norris had asked what was to be gained by reversfng the steam in the middle of a run? It was the same purpose as the reversal between the runs, to obtain a uniform condition of the fires. With the grade of coal in use the short run proved better than the long, making the period of reverse such that the clinker should come where easiest handled. In regard to the Strache and Jahoda and Bunte figures, he still considered the discrepancy more than the 20-candle power of temperature difference justified, nor could he understand the 15 per cent. difference in the carbonic acid. In regard to Mr. Knapp's reference to the distributing of steam, he said that he held like views, but he did not think an improper distribution could be long continued, on account of the probable results. Mr. Miller's query was answered by the statement that the coal was "Wyoming." Analysis gave: Moisture, 2.37; volatile matter, 5.81; fixed carbon, 81.18; ash, 10.61. In regard to temperature, information was indeed wanting. Efforts had been made to ascertain the generator temperature, but up-to-date the results were unsatisfactory.

The President thanked Mr. Morris formally, and an adjournment to 2:30 P.M. was ordered.

Second Day—Afternoon Session.

The President in convening the afternoon session remarked that there were two letters in hand on "The fluctuations of pressure in the mains, due to gas engines," and if no objection was raised they would be published with the minutes and not read. As there was no objection it was so ordered.

The Question-Box Again.

The Secretary read a question from the box,

> "What is a cheap and efficient way of parting the water from carburetted water gas tar at a small works?"

The President said anyone who wished to discuss this could; but he thought the person who asked it should be referred to the answers given to the Class.

The next question considered was—

> "Wanted.—A statement of experience in the use of the so-called gas arc lamp, and opinions as to its value to the gas industry."

The President in calling for remarks said he seemed to stand alone in respect of this matter, and he hoped those who had anything to say on the subject would freely speak their minds.

Mr. E. G. Pratt had no doubt that the President's position was defensible theoretically, but in practice he must take exception to it. In business, duty requires one to look to those things in which interests hang. In his opinion it was the gas arc which made electric arc competition on the part of the gas men possible. It appealed to the light user and made competition successful. No doubt, from the efficiency standpoint, and for better light distribution, a number of single incandescents, properly distributed, were better than an equal number grouped. All the same, the gas arc had its place, for it competed with the electric arc lamp and displaced it, because it appealed to the user—in a word, because the user liked it. For this reason it was the best means yet offered for illumination by gas of large areas inclosed or open.

Mr. Thos. D. Miller (New Orleans) said: "Where Mr. Pratt leads I follow." The President's remarks reminded Mr. Miller of a thing that happened in his business career. A man said: "I am going to fire that fellow and teach him a lesson." Mr. Miller replied, "That is a doubtful way to teach a man a lesson, teaching him and then discharging him, so that some other employer shall get the benefit." The speaker continued, "If it is bad practice to encourage the use of the gas arc lamp, because the principle of it is wrong and you refuse to supply it to your customer, simply because it is bad in principle, who is thereby the gainer? Certainly you are not, and by the time you have him taught you have another consumer in his place. Mr. Miller said in his judgment the proper idea was to educate your customer if you can; if you cannot, do the next best thing—sell him what he wishes to have. There was no question but that electricity after all, in view of the American tendency to go to something new, had created a demand which they were now supplying with the gas arc. The President's remarks applied to the laboratory end of the business. It was all right to educate the people to an ideal if you could, but the commercial end must look out for business and give the users what they want.

Mr. G. W. Clabaugh (Omaha, Neb.) said that he agreed with the last speaker. The President's remarks were technically right, but were commercially wrong. If the gas companies took his advice they would find that while they were running a kindergarten the electric light company, on the other side the street, would be turning out graduates. They would get the business and the gas companies want it. When the gas companies were losing business by the competition of the incandescent filament lamp the mantle came to the rescue; then the arc lamp was pushed. Incandescent burners were scattered through the store, as the President said that they should be, and in which position they gave efficient service, and then came the gas arc to do likewise. If customers came to the gas companies and asked advice it would probably be a good thing to put on long-arm-fixtures if they would be satisfied with what we might recommend; but there were few customers of that kind. People have seen the gas arcs and want them. Our customers say that the gas arc is the greatest thing they have seen in life. The speaker drew attention to the fact that customers knew nothing and cared less about the technical questions, but they did know that tne gas arc light was better than the electric arc light, and only cost one-half as much as the other to run. That was the great factor in their favor, and as Mr. Miller said, "The people want it, and we should sell it to them." Every customer should have what he wished for his money, and if he is warned that this arc will not give him quite as much light as the open burner he will say, "Oh, yes; I have been using the open burner, but my neighbor has the arc. It looks better. I wish to have it." Try to convince him that the single light is better. He leaves, and presently an electric arc is installed. He reiterates his previous statements. We must give people what they want. If they want the arc light they should have it, and it is no part of our business to endeavor to have them use something else. Further, he said the mantle makers should follow up this business and give advice as to the choice of the mantle. An opportunity for comparison with the Nernst light had come to him the other day. Twenty-four such were in one store, and as the place was excellent as an advertisement it was desired to replace them by gas. They put in 12 Nernst lights in competition with 8 gas arcs, and while the 8 probably did not give as much light as 12 Nernst lamps, the 8 gas lights gave more light than 8 Nernst lights; maybe as much as 10 of them. It was a gentlemen's furnishing goods store, and they claimed that they could not show colors as well by the gas lights as with the Nernst lamps, and a demonstration was proposed, The test was very fairly put up. They had black cloth hanging between the two lights. A delicate shade of blue was turned to a beautiful green by the yellow light from the mantle; a pink handkerchief on a black ground showed

up saffron. I appreciated the golden worth of silence, for under the Nernst lights these tints were almost as perfect as in daylight. Next, a suit of clothes was shown. To the gas light it was black, to the Nernst, blue. A dark blue suit under the Nernst light showed light blue; under the gas light it was black. The matter was taken to the Welsbach people and they were requested to furnish a white light. They courteously declared that the light was white. Assured that the yellow tinge was certainly there, they were requested to furnish a white light. The Welsbach people sent a No. 193 and a No. 2 mantle, saying that the No. 2 was the light needed. The No. 193 was put up and shows colors as beautifully as any light—as beautifully as the light of the sun itself. If the proper mantles are used with the gas arc lamps, while the candle power may not be distributed for the best efficiency, it is attractive and it is new, and people are everlastingly looking for that something new. As to injury to the business, the speaker could not see it. By the time the people were through with this fad another would be on the market, When the Siemens-Lungren burner came out it was used until the Welsbach took its place. No injury was done to business by letting the customers have them. The same thing could be said about lava tips. It is not the place of the gas companies to say, "No; it is not a good thing to sell, because it is not as efficient as it should be;" because the electric light companies would get the business and the gas companies would not regain it even with a perfected something. The speaker concluded by remarking: "Let us go on experimenting and improve these arc lamps to a higher state of efficiency, but in the meantime let those which we now have bring us an income by the consumption of gas in our consumers' places."

Vice-President Norris took the chair saying that the President had a few words to say, but before him, was there anyone else who wished to speak?

Mr. Irvin Butterworth (Detroit) said he was on the Committee on the President's Address, and had signed it as such member. In its report the committee ventured to criticize the President's opinion as expressed in his address. He wished to put himself on record in the following individual opinions:

I venture to respectfully take issue somewhat with your President's strictures on those gas companies that are countenancing, or even encouraging, the use of the so-called gas arc lamps. I believe that our interests lie in the direction of endeavoring to provide our consumers with the kinds of lamps that they want. It is a commercial and not a scientific requirement that is to be met. Consumers desire, first, certain forms of lamps, or certain lighting arrangements, that will enable them to do certain desirable things, and the question of efficiency, in the sense of the maximum illumination per unit of gas, is really a secondary matter to them. If users of light were seeking simply the cheapest illumination, they would probably use oil or even candles; whereas, practically half the store illumination of the country is secured by means of electricity, the most expensive form of lighting now in use, proving that people are willing to pay more for what they want. The difference in efficiency between separate Welsbach burners and the so-called gas arcs is not so great as to offset the advantages which the practical and shrewd merchant sees in the use of the latter. In other words, he knows what he wants, and we should try to give it to him; making the lamp that he desires, of course, as economical and efficient as possible, and also telling him frankly that separate burners would be still more economical, if that be true. These gas arc lamps are now so made, as we all know, that either 1, 2, 3 or 4 burners can be used at a time, as may be desired.

The President expressed himself much as follows: The evidence was all of one kind. The yellow journal's reason was the gas arc's reason for evistence—the public demands it. That was the only argument yet offered. The speakers had taken it for granted that they could not put up a chandelier where they now put up gas arcs. Is there any reason why one can be put up and not the other? Now, as to the injury to the business, the electricians are using much ingenuity and good taste in ornamentation by the use of lights, and electricity yielded better results in this way than gas. The duty of the gas men was to do the best they could with the materials at command, and they were doing just the opposite. As long as they had no high candle gas burners they used to get up in these meetings and decry high candle power lights. When we got them we went off on the other tack and brought them out in both hands. "We leave these things in a man's store, things we would not put up in our own houses, they are so hideously ugly." He had had practical experience in the matter. The Company moved into a new office in January. One of the supply companies asked permission to instal gas arcs. There was much to do. Permission was given and the arcs were put in. The question of the gas arc came up and the commercial men took exception to the fact that "I would not countenance the general introduction of the gas arc—that is I would not encourage it." This fall the question came up again. Fitting was ordered with simple, cheap chandeliers, Welsbach burners and rose colored holophane globes, and Mr. Miller did not think it looked like the same place. "While before it looked like a warehouse, after we made the change it looked like a gas office." Mr. Miller insisted there was nothing more to say. "The public demands it," was an argument for the sale of opium. I think it will hurt our business because the arcs are so hideously ugly that they will prejudice people against the use of gas. If a man has any taste the gas arc must prejudice him against the use of gas for lighting. It is an object lesson always before his face.

Mr. Thos. D. Miller said he must again take issue with his name sake. The most important point had been lost sight of, a potent one in the judgment of the speaker. The electric arc emits light from a point, the gas arc from a surface almost infinitely larger. It emits an effusive light, one more nearly approaching sunlight than any other artificial light, and the comparison is between the electric arc and the gas arc, and the gas arc emits a light which illuminates and is diffusive; the electric arc one which does not illuminate. Artistically the gentleman from Baltimore was certainly in the wrong. From a commercial point of view the speaker had to handle both sides of the question, and one point impressed him strongly, *the gas consumer never changes.* The gas man does change. He grows old and passes away. Not so the consumer; he is a continuous growth and the educational process would be never finished. Meanwhile the electric light man would be getting the business which the gas men want. There is no denying it, the man who is getting an income is the man who is making a success of life, and one cannot afford to ignore the practical side, and this is represented by the man who gets the business and shows the revenue. In other words, live for what is before you, not for what you may hope for—that is the whole question of life; and the man who solves this best gets the most out of existence.

The President, interposing, said: "I made the statement that I think it is as easy to have the chandelier put up as any other form of lamp."

Mr. T. D. Miller replied: "It is not as easy."

Mr. A. C. Humphreys said he did not expect to speak on this subject, nor was he intending to speak on the point at issue, but Mr. T. D. Miller had made one statement which was not scientifically correct. There is no difference in quality as to the diffusive power between the gas arc and the electric arc. It is a mathematical question and the size of the light sources is involved. If the two lights were of the same candle power and were spheres of equal luminosity there would be no visual or visible difference.

The Secretary said Mr. T. D. Miller had said that you do not want to educate the customer of to-morrow or next year, but to get the business of to-day. The statement might be amplified by saying, "You can get the business now which will ruin the company next year."

This, Mr. T. D. Miller said, was a mistake. He had said, "The point was to do the business that you can to-day and not try to educate the consumer who would die to-morrow and leave a new one to be educated." He further joined issue with Mr. A. C. Humphreys, and then returned to his theme, that the customer of to-day wanted the gas arc. The man of to-morrow wanting something else will demand that something which may have momentary vogue.

Mr. W. C. Morris (Long Island City) pointed out that in all this prolonged discussion it had been taken for granted that the public wanted the gas arc. It was his experience that the gas arc was pushed because nothing better offered. He noticed that bartenders, who are specially tender of popular approval, lighted saloons with individual lights. The ordinary burner used is the No. 2 Kern, and they put them around the room until it blazes with light.

Mr. T. D. Miller said the reference to the Kern burner reminded him of an experience. A man said to him that he had an experience with a Kern burner which he wanted cleared up. He had a match safe, the opening and closing or suddenly dropping the lid, extinguished his light. Why? I explained that the musical note of the tube and the match safe were the same, hence the result. I had nothing else to offer, and gave him the best I had in the shop.

Mr. G. W. Clabaugh (Omaha) said the gas arc did not cut out chandeliers, but it did cut out the electric arc, and that was the man he was after. We have cut out 500 electric arcs and we could not do it without the gas arc, said Mr. Clabaugh. One of his customers had begun on Welsbachs, supplanted these with electric arcs and then later with the gas arcs, and the man was delighted with the result and made an

excellent reference. If a customer wants a gas arc, let him have it. It is the only sensible thing to do.

Mr. Ira F. Wortendyke (Janesville, Wis.) ascribed the choice of the gas arc to the fact that it gave more light for the same amount of trouble.

Mr. Walton Clark said Mr. Glass had told him that in Milwaukee, where they built a new office building, they spent $2,500 on chandeliers, 6-armed, and put in Welsbach lights. Finding them unsatisfactory they put in gas arcs with 4 burners and found the room was better lighted, was more attractive and the effect was very handsome. Mr. Clark admitted and asserted that President Miller was perfectly right, but the public demanded the gas arc. There could be no doubt about that. The business of a company was to teach the public the best way of using gas, but not to educate the consumer away from using gas; and certainly not to refuse him a gas arc, if wanted.

Mr. A. C. Humphreys said that in regard to the commercial aspect of the subject he agreed with both sides, but when it was said that one source of light had a superior diffusive quality as compared to the other he objected. The question was a mathematical one, and the diffusive quality of the light is not changed. Mr. Clabaugh's argument could not be gainsaid, "if we can sell gas arc lamps and cannot sell any others, then sell gas arc lamps we must."

Mr. John H. Keppelman (Reading, Pa.) said that in their offices they found the chandelier the better light, still they sold gas arcs more than the others.

The President resumed the Chair, and called for the paper, by Mr. Henry L. Doherty, of New York, detailing

SOME FEATURES OF MUNICIPAL OWNERSHIP.

[For the text of Mr. Doherty's paper, see JOURNAL, Nov. 2, page 684.]

Discussion.

The President asked for a good discussion respecting the points put forward by Mr. Doherty.

The Secretary responded, saying that effort had been made to obtain discussion on this subject from men not engaged in the gas business, but who were well informed on the matter of municipal ownership. Unfortunately the paper was delayed and also the replies to requests for discussion could not be gotten out in time. One was from Prof. James Mavor, of Toronto University, who is studying the question for the benefit of that city.

The communication from Prof. Mavor was then read, as follows:

I have read with great interest Mr. Doherty's paper, and I am especially pleased with Mr. Doherty's statement of the arguments advanced by the advocates of Municipal Ownership and with his answers thereto. These I think should be read with care by every man who is concerned with the operations of a gas plant and the protection of a gas company's interests, and by every man who is concerned with municipal government, and who, therefore, is, or should be, a protector of the interests of the citizen. My experience justifies my indorsing Mr. Doherty's statement that the threat of municipal ownership has a deterrent effect upon investment. It needs no argument to prove that capital will not seek investment where it is likely to come in competition with a municipally owned plant, or where it is likely to find itself without a franchise, or compelled to sell at an appraised structural valuation, because the citizens of the town in which it is invested have a hankering to experiment with the ownership of a railway or of a gas plant. I do not think we need prove that socialism is either impossible or inequitable in order to demonstrate the unwisdom of a city undertaking the ownership and operation of a gas plant. There is little that I can say that I have not said to you before upon this subject, or that is not contained in Mr. Doherty's paper. I believe that the operation of industries is not an essential or a natural part of the function of a municipal government. I believe that the burden of proof is on any government desiring to enter on any enterprise not essential to the exercise of the police power and the protection of life, health and property. That the operation of a street railway or an electric light or gas plant is essential to this protection, is not susceptible to proof. Personally, I am very much concerned as to the condition of the pavement in front of my neighbor's house, because I must walk over it or drive over it, if I would leave my own premises. All the material that is brought to my premises is hauled over it, and I am a loser if the pavement is not in good order. I am very much concerned with the question of the condition in which my neighbor keeps his back yard, because if his premises are in an unsanitary condition I or my children may contract disease. I care not at all, except as I may be a stockholder in some interested corporation, whether he lights his house with gas, electricity or candles, or whether he sits in darkness. I do not care whether my neighbor walks, drives, rides in a trolley car, or stays at home. Therefore, the protection of my rights does not requrie that the city interest itself in providing means for lighting buildings or for carrying the public in the city in which I dwell. And I maintain that a government's exclusive function is the protection of the governed in their rights, except that a government may appropriately undertake such work as is to the unquestioned interest of the whole people, and without expectation of direct financial profit to the government. There are few such opportunities. The paving and draining of the city and fighting of disease are instances. The deepening of harbors and carrying of mails may be others. I think Mr. Doherty has been wise to limit his discussion of this subject to the theories involved. To quote figures involves introducing questions and details from which we cannot thresh the truth in the few hours we may devote to the subject at this meeting. I believe him to have established that the municipal ownership with operation of industries is wrong in theory, and with that I am at this time content. I have had opportunities for learning the results of the operation of municipal plants, and from them I learn again that what is wrong in theory cannot succeed in practice. I have visited a number of municipally controlled plants and heard the arguments of the advocates of municipal ownership based on largely the operation of these plants. I have found their statements frequently not to accord with the vital facts, and I have recorded some of these differences in the "Proceedings of this Association." I do not believe that the arguments we have made or are making, or any arguments that we may make will have effect on the at present pronounced advocates of municipal ownership. I do believe, however, that, properly presented to the thoughtful and uncommitted citizen, they will go far to prevent his being misled by the arguments advanced by the advocates of municipal ownership. I recommend to each of you that you be always prepared to so prevent them. I believe it to be your duty to your employer and to your government.

The Secretary said he had not planned to say anything, but as Prof. Mavor's first paragraph was exactly his idea on the subject, he wished to extend the statement. It seemed to him that only two notions were ever discussed; unrestrained corporation ownership and that of the municipality. If the evils really exist they will not be cured by a simple change in ownership. The evils resulting from corrupt politics would be just as great under municipal ownership as now; in fact, municipal government being what it is, they would likely be even greater. To do away with corruption a controlled corporation was required, and the speaker thought a suitably controlled private ownership was to be preferred to any public one. Then the Secretary went on to say: "Prof. Mavor promises a complete discussion within two weeks, and I proposed that the Secretary be empowered, after consultation, to publish the same as part of the proceedings." A motion to this effect was carried.

Mr. Walton Clark (Phila., Pa.) said he had made a few notes on this subject, having read the proof of Mr. Doherty's paper. These Mr. Clark submitted as follows:

What seems to me a desirable end to aim at with regard to public utilities is well-defined public control by Federal government, State or municipality, preferably by the more powerful and impartial authority. This control should be sufficient to prevent injurious exploitation of the public by the corporations on the one hand, and sufficient to prevent injurious exploitations of the corporations by the public on the other hand. The exercise of this control with certainty and regularity would prevent spasmodic interference with the corporations holding public franchises and at the same time would compel them to live up to their contracts under the guarantee that if they did so their interests would be respected. Uncertainty of tenure has always led to inadequacy and to high cost of service. Restrictions, perhaps honestly imposed in the assumed public interest, have often turned out to be disastrous both to the corporations and to the public. When municipal ownership of the streets has been duly safeguarded in the common interest, it seems to me that the cheapest and most effective service in the public utilities almost without exception can be obtained by leasing the right to perform these to spontaneously organized corporations, and then to allow these corporations the utmost freedom in the management of their business. No corporation can for any great length of time continue to render inadequate service at an exorbitant cost. The so-called monopolistic character of the public utilities has been greatly exaggerated. The progress of modern invention must speedily alter current views in this connection. There is no monopoly in light for example; oil, gas and electricity are already violent competitors, and it may be that the recent discoveries in radiation will completely upset the present conditions both of public and private lighting. Surface railways,

elevated railways and subways compete in civic transportation, as electric and steam lines compete in inter-urban transportation. The substitution of new methods has destroyed, or may destroy any of the so-called monopolies. The safety of public, franchise holding corporations must therefore lie in efficiency of service and in constant alertness in satisfying new customers, rather than in formal observance of inflexible regulations. It is clear, moreover, that the terms of the lease must be such as will enable the service to be rendered at the lowest cost to the community, and this desirable end cannot be attained unless the company to whom the lease is granted is at any rate not prevented from securing the service at the lowest cost in respect of interest and other charges. If the tenure is uncertain, the terms of the least inexact, or the conditions irritating, the service cannot be cheap. The cost of litigation, for example, howsoever entailed, must in one form or another be borne by the public. Compulsory co-operation, which is involved in municipal ownership and operation, appears to be less advantageous upon many grounds than spontaneous co-operation, even with an absolutely honest municipal government. The grant of leases on such terms as will enable the grantees to obtain their capital at the lowest rate, and to conduct their business in the most economical way, must be more flexible, more likely to be progressive in technical methods and more likely to be cheap than than the operation of these services by municipal functionaries, who are often appointed, not because of their technical ability but because of the political influence which they are able to command.

Mr. G. W. Clabaugh (Omaha, Neb.) said he had listened to Mr. Doherty's paper with interest. He considered it a good plan to let "The sleeping dog (municipal ownership) lie;" but he did not think Mr. Doherty had wakened or even roused the beast, only rolled him over to dream more pleasantly. He had handled the question so as to do good to both sides. He believed if the paper (or a copy of it) were sent to every mayor in the country it would result in good effect. This municipal ownership idea was a political question. Here peated his belief that the paper was one of the greatest usefulness.

Mr. R. M. Searle (Mt. Vernon, N. Y.) wished to emphasize what Mr. Clabaugh had said. The company he represented had buried the municipal ownership spasm four times. The Vice-President had worked hard and had convinced the people that they would not be benefited whenever there had been a call for a vote on municipalization propositions. The more papers they had showing the weakness of the movement the better, and the easier it would be to head off municipal ownership. A paper on this subject intelligently circulated would do more in a minute than the company's servants could do in a week.

Mr. D. McDonald (Louisville, Ky.), said that a public utility corporation was on a different basis from a grocer. If the grocer displeased one you could go to another; if the public service corporation was unfair all you could do was to growl and pay. The gas companies had given the public the benefit of the reduced cost of illumination, and if other public utilities had done the same there would be no municipal ownership agitation. What the people want is not so much municipal ownership as fair treatment. The gas companies had put the increased earning power of improvements into a lower price; the others into "water" in the stock. In England there were laws which made the dividend depend upon the selling price; if the price were lowered the dividend could be raised, if it could be earned. If the people understand that they are in a way the partners of the company they are the company's friends; but the opponents of municipal ownership must use care. If they gave the people no hope of cheaper gas (for instance) they would find that they had taken a position from which they could not recede but would be driven.

Mr. Walton Clark was not acquainted with any corporation which had taken the attitude described. Mr. McDonald was certainly wrong in the matter of street railroads. In a number of places fares had been reduced, in others there was great gain in time which is money. In New Orleans the price might be the same as in the mule days, but now one could go from Canal street to Carrollton in 20 minutes, much less than the time taken in the mule days. The citizens of New Orleans were highly benefited by the trolley. In Philadelphia fares had been reduced, and so usually throughout the country. The "Public gets a greater advantage from improvements than the companies do," was the text and summary of Mr. Clark's thought.

Mr. F. D. Miller (New Orleans) said a point that had not been brought out was the moral certainty that a fight for its life as a corporation and for its property was continually oppressing every public service corporation in the land. As a consequence it must provide for this battle for life, and must lay up the sinews of war to be master in making this same fight for life, or against competition which would be destruction. It occurred to him that the best solution was absolute monopoly guaranteed by the organic law. That would make the war chest needless, and consequently expenses (therefore income, fares and charges) could be reduced. This had been presented by him in his work as an argument why, under the present conditions a company could not render service as cheaply as if it were guaranteed immunity under proper conditions and supervision. Mr. Doherty says take away this continual threat of competition—that is the very point I would make—taking away the threat of competition would make it possible to operate a plant at a less rate of interest on the investment. The value of a corporation method of doing business was lost sight of in the present excitement; the fact that the man of small capital was, by the fact of corporate existence, able to share in the very largest enterprises, to be a participant in a public service corporation did he wish it. That was the secret of the success of the American people—the fact that such possibilities and opportunities are given to them. The poor man's dollar was given the same earning power as the rich man's dollar, by means of the corporation. In his opinion the securities of these corporations should be issued in denominations so small as to put them within the grasp of any man who could save, and then the advantages of investment should be made clear to the public and their participation invited, compelled by the obvious advantages offered. It was the evident over-capitalization of the public service corporations which was making all this trouble. In special connection, Mr. Doherty had said if there was a reason for a municipality to engage in business the reason should not be opposed to wisdom, and there must be some special reason for selecting this particular line of business enterprise. The answer Mr. Miller gave was Jeffersonian. Government should confine itself to its legitimate lines, and not enter upon projects within the proper domain of individual enterprise. In the speaker's opinion monopolies were quite proper when under proper regulation and control. A monopoly is an advantage, if it serves the people in the best possible way. I mean that a monopoly (guaranteed) can render better service (at the same price) than a competitive concern, because it is not obliged to protect itself against competition. The protection of municipal officers from temptation was one reason given for municipal ownership. There was no reason why the saying, "Virtue rewards itself" should not apply to the municipal officer as well as to anyone else. Mr. Miller did not stand in the line of those who believed that municipalities had to go into business to make the municipal officers honest, nor did he believe that the attempt would succeed anyway. He happened to be familiar with an application of the principle of taxpayers' voting on the question of municipal ownership, because he knew of the bill authorizing one of the most gigantic of failures in the whole history of municipalization—the dam at Austin, Tex. Every man who could was made to pay a tax so that he could vote on the question, "Should Austin dam the Colorado?" They had voted by a large majority "To dam the Colorado," and ever since they had been damning it. The result of the vote was a majority in favor of the city of Austin building the dam, and the corollary was that the man who was using the lights and buying the electricity was not the man who was paying the taxes. After a year or more of operation Austin's Mayor issued a circular asking why they should patronize a private instead of a public enterprise in which they were stockholders, and said, "If you do not patronize this municipal plant you will have to pay taxes to make up a deficit." That is municipal ownership in a nutshell.

The President then asked Mr. Doherty to close the discussion.

Mr. H. L. Doherty said the arguments he had given were by no means all on his list, but he did not wish to be prolix. He had taken those which seemed to him to have the most importance and cut out the rest. There were plenty of arguments against municipal ownership; one of the best is that municipal ownership does not provide for a proper disposition of benefits which might accrue, granting the allegation that benefits do accrue, which, in point of fact, was contrary to experience. The question of municipal ownership is one which "Will not down," and the men who were bringing it up would continue to bring it up. It was done for a certain purpose, and it would be well to get rid of the threat of confiscation, even if the threat were an empty one. They had not considered it empty a few years back, and capital was timid and considered the threat more to be feared than those who had had experience with it; for this reason the question of municipalization should be met and put out of the way forever—if possible, it should be "disposed of." Mr. Clabaugh took the position which he had taken when the question was first discussed, that it should not be agitated. This was true enough, if agitation were to leave the gas companies in a worse condition than it found them, the friends of municipalization certainly would keep the agitation going, and something

more to the purpose than words was needed to combat the agitators. The National Electric Light Association had taken a most aggressive stand on this question, and the American Gas Light Association, he considered, could afford not only to pledge their moral, but if need were their financial support, and to demonstrate the true condition of municipal ownership to-day.

The President, having thanked Mr. Doherty in formal fashion, said he had a letter from the Chairman of the Committee on Electrolysis stating that they had not been able to prepare a report for this meeting. If no one objected, the Committee would be continued. [No Objection.]

Then was read the question, "Should not gas companies make a minimum charge; say $1 a month, for service?" Replies had been received, but there was no *time* to consider them. Being an important question, it was suggested that replies should be consigned and sent to the Secretary. If there were no objection they would be published *as proceedings*.

Votes of Thanks.

Mr. Robert Young (Pittsburg, Pa.) moved a vote of thanks to the President and to the Committee of Arrangements.

Mr. Clabaugh amended by suggesting a rising vote. Mr. Young accepted the proposition, and Mr. Norris put the formal question, which, of course, was adopted.

Mr. W. C. Morris then moved a recess until the next afternoon, and that after the return from the excursion formal adjournment be made. [Adopted.]

ROLL CALL.

Those present at the meeting, according to the Secretary's tabulation as furnished with his complete approval, were:

Active Members.

Africa, W. G., Manchester, N. H.
Allen, W. H., Newark, N. J.
Ammon, H T., Wyandotte, Mich.
Arthur, F. M., Philadelphia, Pa.
Barret, A. H., Louisville, Ky.
Barrett, W. E., Ardmore, Pa.
Battin, H. S,, Philadelphia, Pa.
Battin, I., Omaha, Neb.
Baxter, I. C., Detroit, Mich.
Beal, T. R., Poughkeepsie, N. Y.
Beck, G. W., Sunbury, Pa.
Bennett, C. W., Red Bank, N. J.
Blinks, W. M., Kalamazoo, Mich.
Blowers, F. W., Kalamazoo, Mich.
Bredel, F., Milwaukee, Wis.
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[Prepared for the Journal.]

Two Gas Company Regulations which Need Legal Reinforcing.

By Mr. E. H. Yorke.

There appears to be no general agreement, based upon a careful and comprehensive consideration of the factors involved, as to the proper procedure which shall govern gas companies in allowing the supply of gas to be shut off and turned on by others than the gas company's agents, or to turning on the gas to interior piping not known to be properly put in or gas tight.

There appears to be generally among the gas companies established regulating rules supposed to govern these details, but it will be found that among most gas companies the rule is honored more in the breach than in the observance.

The writers of technical gas papers do not seem to have given any thought to these subjects, although of great moment. The situation, therefore, appears to be that no uniformity exists in the methods employed in dealing with these details, and that each gas company appears to be a law unto itself.

That the present laxity in these directions is not good practice, and does not conserve the safety of the public or interests of the gas companies, will be apparent when the attendant dangers are carefully considered. The present shutting off or turning on of the gas at the meter by the average gasfitter, when he desires to make repairs, appears to him a safe and simple operation. But let us see what results may follow.

Being unfamiliar with the conditions he may extinguish burning lights, pilot lights and gas stoves in use. There may be other consumers on the same supply unknown to him, and when he again turns on the gas, such act may create conditions from which explosion and asphyxiation may follow. Or he may forget and go away without turning on the gas, thereby leaving the consumer without light.

Aside from these hazards to the consumer, the gas company suffers, through interruption to its business, loss of the sale of its product, is subject to expense in having to send its men to turn on the gas, and is injured through the distrust created in the minds of the consumer that gas is not a reliable lighting agent. As there is no penalty attached to the gas company's regulation, of what value is it, aside from the slight moral effect which it may have?

For all these reasons it is obvious that the breach must be filled by a public statute, and every consideration of public safety and the interests of the gas company call for such regulation by city ordinance.

The second regulation which needs legal reinforcing is that which states that gas will not be turned on to interior piping not known to be

properly put in and gas tight. Can such a regulation be successfully enforced?

There are some reasons for doubting that it could be. In the first place, the gas company admits that the piping in the building belongs to the owner, hence the gas company has no rights or responsibility in the premises.

The owner maintains that even if the pipes are inadequate in size, are not properly put in, or are not gas tight these are things not the gas company's concern, and that he assumes all the responsibility for any and all results which may follow turning on the gas to such piping. Beyond this, he draws attention to the fact that he must pay for all gas registered by the meter. Under these circumstances how can the gas company refuse to turn on the gas, although it may suffer, as a consequence of such defective piping, from complaints of poor gas, of excessive bills due to leaks, and may be injured by the consumer abandoning the use of gas.

In view, therefore, of the lack of knowledge on the part of the public regarding gas the hazard in turning on the gas to piping not known to be tight, it would appear that every consideration of public safety and the reasonable rights of the gas company demand that public statutes should regulate this matter, and sustain the gas company in its effort to protect the public from harm through the latters lack of information on the subject.

Iron Roofs for Gas Works.[1]

By Norton H. Humphreys, Assoc.M.Inst.C.E., F.C.S.

I was particularly interested in seeing, a few weeks ago, some attention directed toward this subject, through the paper read by Mr. Cutler before the Eastern Counties Gas Managers' Association, and the subsequent discussion; having for the last ten or twelve years adopted iron roofs in preference to those covered with slates or tiles, for ordinary purposes in gas works. The term is sometimes applied to roofs of which the framing—the principals and purlins—is made of iron, in contradistinction to those in which such parts are of timber, and without regard to the covering. But it is here employed as indicating roofs in which the covering as well as the framing is of iron. While the use of wrought iron for principals is universal, its utility as a covering material is not so generally known or appreciated; and therefore it is to this part of the subject that attention is now specially directed.

One objection, which, according to the usual order, is raised—chiefly by those who have not tried the system—may first be noticed. It is roundly asserted that the sheet iron covering plates must be painted every twelve months, and that even then their durability will be short. Yet many of those who make this assertion are in charge of holders perhaps nearly half a century old, the plates of which are as good as when new, and this notwithstanding the continued rising and falling of the side plates and dipping in and out of water. If the side plates of a holder can be maintained for an indefinite period, why not an iron roof? To begin with, a *properly* painted iron sheet will last more like twelve years than twelve months; and for gas works purposes it is as durable as, or more so than, galvanized sheet, which is certainly fairly impervious to damp and water, but if anything is more open to the attacks of sulphurous or ammoniacal vapors than black iron. The process of dipping softens the iron to some extent; and black iron is not only cheaper, but stiffer and stronger than galvanized.

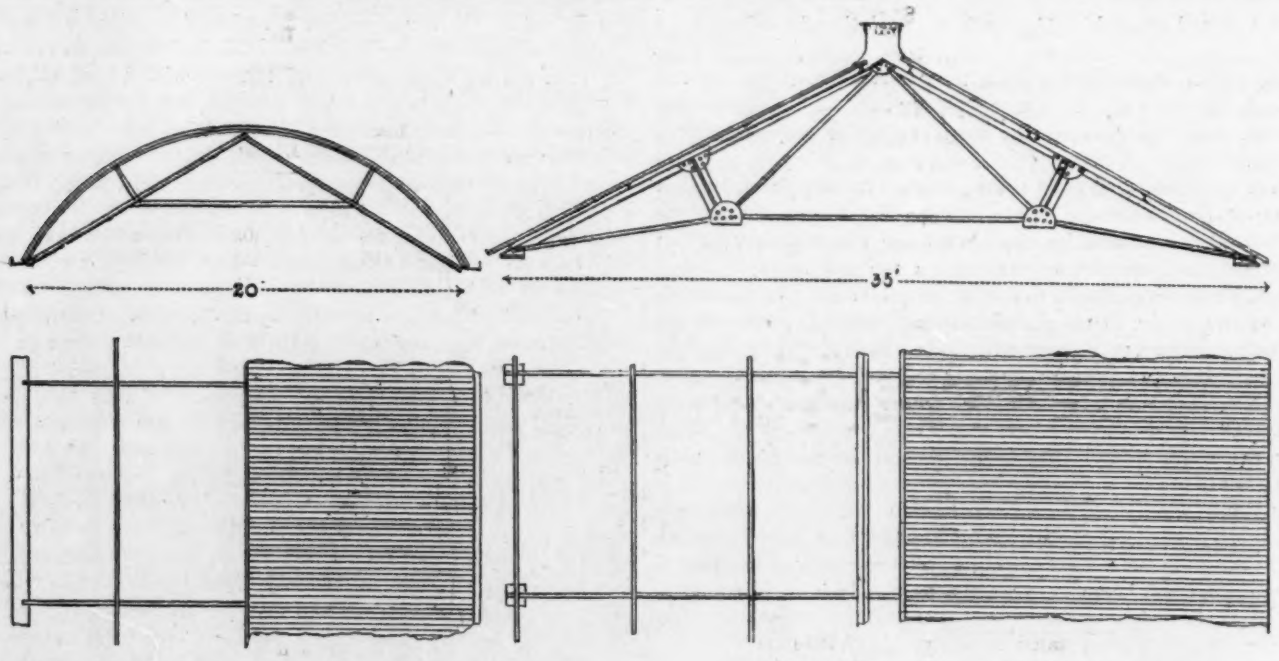
But what is a *properly* painted sheet? An answer to this question is scarcely necessary in the case of the gentlemen who keep gasholder skins in good order, as the mere fact of their doing so involves a fair acquaintance with the subject. They need simply to apply the same degree of skill and intelligence that is used in regard to the gasholder. The surface of the iron must be dry, clean, and not too cold; and the paint must be pure and finely ground. It is simply waste of time, if not worse, to lay paint on a cold, damp surface. In some works, the inside painting is looked upon as a wet-weather job which may be done at any season of the year. Good painting weather, unfortunately, bas been a scarce article of late. During the past summer, we have barely had six weeks' duration in all of really favorable weather. Of course, one must make the best of opportunities; and it is sufficient to remark that paint laid on anyhow in any weather is not likely to be a success. We are often told that painting, like many other things, can be left to the intelligent utility man. This worthy will make a competent painter if properly instructed and trained, but cannot be expected to spontaneously develop such desirable qualifications. In the examples to be described, the sheets were coated with boiled oil at the works, and protected from the weather during transit. On delivery, they were at once transferred to the warm corner to be found in every gas works, thoroughly cleaned with wire brushes, any accidental rust marks well burnt out with the blowpipe lamp and touched with boiled oil, and while quite dry and fairly warm coated with the best red oxide paint by the medium of a painting machine. The machine is preferable to brushes, either for raw material or finished work, as it economizes paint, secures a more even coating, and penetrates crevices more closely than is possible with hand work. As already remarked, sheets thus treated will stand ordinary exposure for several years. The macbine can, of course, only be used for flat surface work. Bars, lattice work, etc., must be coated with the brush.

The special advantages afforded by this form of structure are cheapness, lightness, and absolute tightness as regards wind and weather. There is no trouble similar to that experienced with tiled or slated roofs, which are apt to be disturbed by heavy wind or rain; and the fall of individual slates or tiles is a serious peril to the workmen. The iron roof does not afford facilities for the accumulation of soot or dust, which gathers in considerable quantity on the underside of a tiled or slated roof, and drops from time to time, or is scattered all over the place in gusty weather. Both slates and tiles are apt to be fractured or softened by currents of hot air and steam; and the fastenings, whether wire or nails, are liable to be prejudiced by the same agents. The weight of the slates alone is 6 or 7 cwt. per 100 feet super., and tiles are considerably heavier; and if the laths are of iron (as is necessary in the case of a retort house roof) 1 to 1½ cwt. must be added. But corrugated iron, No. 16 gauge, only weighs a little over 3 cwt., or less than half; and not only this, but it is stiffer and stronger, and consequently the struts er other supports can be farther apart. The principal rafters of a tiled or slated roof are usually strutted at about every 6 feet of length, and are not set more than 8 feet apart; but with corrugated iron, a length of 10 feet may be left unsupported, and the principals may be 15 feet apart. This means a considerable saving in the cost of each principal. Fewer numbers being required, the structure is necessarily cheaper. The ordinary single truss may be used up to 40 feet width; and, in addition to this, only half the number of principals are required. I have taken down the principals of a slated roof, and set them at double the distance apart for a corrugated iron roof, thus making them available for double the former area. No laths are required; angle iron purlins 6 feet apart being sufficient. These considerations show that the saving in first cost leaves a good margin for painting, and for re-sheeting two or three times if necessary.

These points first came before the attention of the writer about twelve years ago, when considering the question of the renewal of a roof over an existing building, of wide span. The walls were somewhat slight in section, and it was thought that they would not stand the weight of a substantial roof of the usual pattern, without further strengthening. The satisfactory nature of this first departure led to further development of the plan. Several roofs of a similar nature, for retort houses, coal sheds, lime sheds, and similar structures, have subsequently been erected; and though some have been standing ten years or more, they have not yet required replacing. Four examples of these, having spans varying from 20 to 70 feet, are shown in the illustrations. The smallest is over a coal shed; the second, 35 feet span, over a single retort house; and the third and fourth are over double retort houses. The largest represents the greatest width required under ordinary circumstances in a medium sized gas works. It leaves a clear space of 24 feet wide on each side of the bench; being sufficient to admit of mechanical drawing or charging.

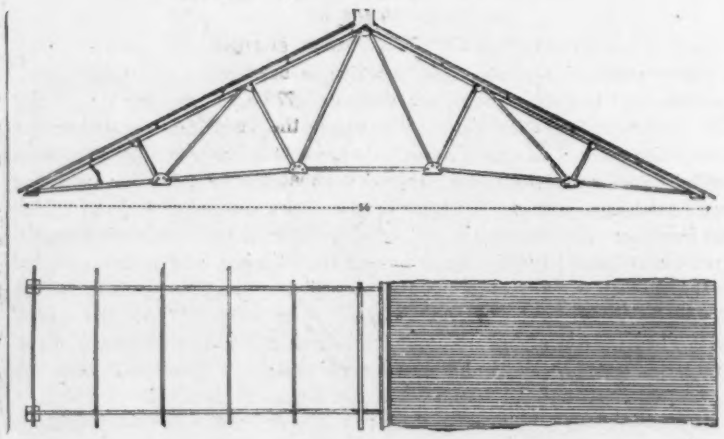
One or two special structural features may be noticed. In accordance with the plan now generally followed, flat bar iron and gusset plates have replaced round rod with forked ends, eyes, and pins. A principal can be made up of only two sections—viz., tee iron for the rafters, two pieces of the same riveted back to back for the struts, and bar iron for the ties, double bars being used for the tie between the roof shoe and main strut on each side. The gusset plates can be cut out of ¼-inch or ⅜-inch plate, and the same section can be used for making the wall plates or shoes; so that the construction of framing up to 40 feet span is a very simple matter, and not beyond ordinary smith shop resources. In place of the usual louvre pattern ventilator, a plain opening, framed by a structure of ¼-inch plate stiffened with angle iron, and 12 to 18 inches wide, is left along the ridge of the retort house; and for other purposes square openings at about 10 feet apart, framed in a similar manner, and furnished with flap doors if desired, are provided. The advantage of providing a free upcast, without anything in the way of a baffle, is very marked. In the retort house the smoke and steam spread in a thin layer, and diffuse without being so noticeable or attracting so much attention as that from a louvre ven-

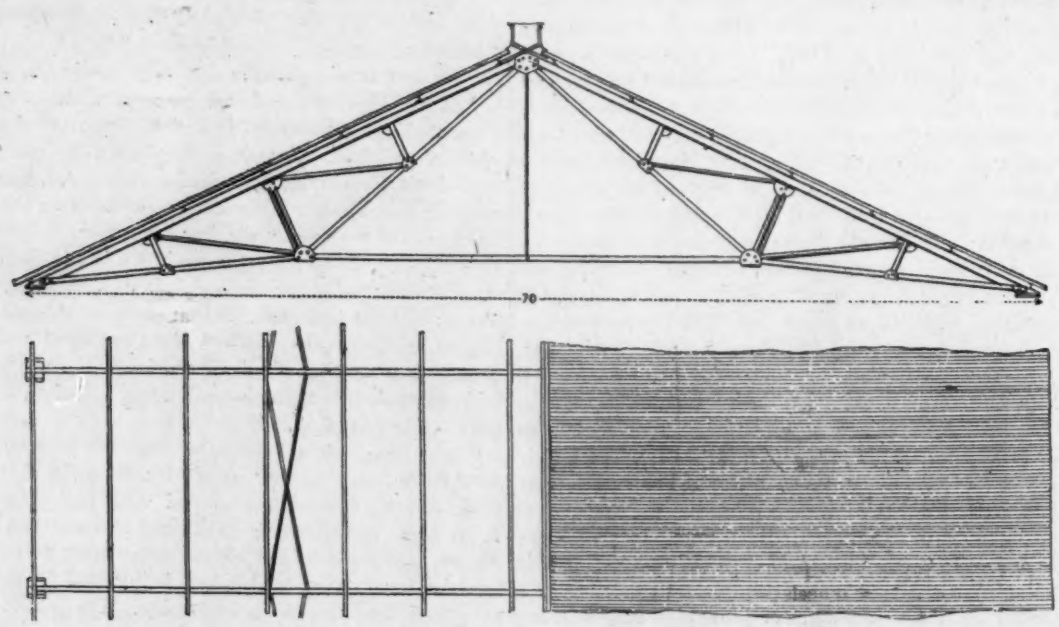
1 *Journal of Gas Lighting.*



tilator. In Fig. 1, a method of construction is shown adaptable to positions where it is not desired to overlap the wall, as at the outside boundary of premises, or where one wall also forms part of an adjoining building of greater altitude, and extends above the roof. A run of ordinary channel iron, 9 inches wide, is laid in cement on the top of the wall, or else supported on corbels or brackets built into the wall, as may be required.

It is usual to build roofs much lighter in construction and using thinner sections of covering sheets; but the dimensions described, while securing strong, stiff structures, are so cheap as to leave little margin for any substantial saving by reducing sections. A square of No. 16 gauge corrugated iron only costs about 30s.; and the labor of fixing, painting, etc., is the same irrespective of the thickness. A square of No. 20 gauge would cost approximately 20s., and one of No. 24 gauge 10s., but the thinner sections would require supporting at more frequent intervals.





The following are the dimensions of the roofs shown in the illustrations; and in each instance an elevation of one principal and a part plan covering two principals are given. In the case of roofs extending to more than six principals, diagonal wind ties are fitted in addition to the framing shown. The main struts are connected together by tie rods in the small and by cross bars of tee section in the larger roofs.

	Fig. 1.	Fig. 2.	Fig. 3.	Fig. 4.
Main rafters, T section	2×2½	3×4	3×4½	....
" " I "	....	....	....	7×3½
Struts, T section	2×2½	3×4	3×4½	4×4
Struts, T section (double)	....	3×4	....	4×4
Main tie bars, flat	2×½	2×½	3×½	4×¾
Intermediate tie bars, flat	....	....	....	2×¾
Shoe or wall plates	....	12×12	14×12	14×18
Purlins, L section	2×2½	3×3	3×3	....
" " trussed	....	....	....	4×4
Cross bracing, T section	...	....	....	2×2½
Covering, black corrugated iron	16g	16g	16g	16g
Ventilator, sheet iron plate	¼″	¼″	¼″	¼″

American Central Electric Station Statistics.—No. III.

Physical Equipment of American Central Stations.—In continuance of the digest and analysis of the statistics of central stations in the United States, as reported by the Census Office, next comes the data of the physical equipment of the 3,620 plants reported upon. It appears that more than one-half of the private stations and three-fourths of those operated under municipal control have a dynamo capacity of less than 200-horse power. The dynamo capacity of 86.3 per cent. of all central electric stations is less than 500-horse power, and 83.8 per cent. of the stations operated under private ownership have a dynamo capacity of less than 500-horse power each, as compared with 95.2 per cent. of the stations operated under municipal control. Of the total number of private stations, 7.1 per cent. have a dynamo capacity of between 500 and 1,000-horse power, while 3.1 per cent. of the municipal stations are included in this group. The dynamos of only 1.7 per cent. of the municipal stations have a horse power capacity exceeding 1,000, while the horse power capacity of 9.1 per cent. of the private stations exceeds this quantity.

In 3,301 stations, the dynamos are operated by the use of steam or steam and water power. In a number of cases the steam power is merely auxiliary to the water power, being used only when the water power is not available. There are 319 stations in which the machines are operated by the use of water power exclusively. These stations have 649 water wheels with a stated capacity of 222,585-horse power and a dynamo capacity of 172,101-horse power, the kilowatt hour output of current for the year being 259,105,461.

The total horse power capacity of the steam engines and water wheels reported by the central electric stations, as used for the operation of dynamos to generate electric current, is 1,772,813. Of this amount 1,379,941-horse power, or 77.8 per cent., is the indicated capacity of steam engines and 392,872-horse power, or 22.2 per cent., the stated capacity of water wheels. The indicated capacity of steam engines and water wheels in the stations operated under private ownership is 1,614,577-horse power, or 91.1 per cent. of the total, and of those in stations operated under municipal control, 158,236-horse power or 8.9 per cent. The varying capacities of the steam engines is shown from the accompanying table:

Steam Engines—Private and Municipal Stations, and Percentage Each Class is of the Total: 1902.

Class of Engine.	Total.	Private Stations.	Municipal Stations.	Private Stations. Per Cent	Municipal Stations. Per Cent.
Total—					
Number.....	5,930	4,870	1,060	82.1	17.9
Horse power.....	1,379,941	1,232,923	147,018	89.3	10.7
500-Horse power and under—					
Number.....	5,450	4,407	1,043	80.9	19.1
Horse power.....	848,836	715,418	133,418	84.3	15.7
Over 500 and under 1,000-horse power—					
Number.....	279	266	13	95.3	4.7
Horse power.....	194,070	184,670	9,400	95.2	4.8
1,000-Horse power and over—					
Number.....	201	197	4	98.2	2.0
Horse power.....	337,035	332,835	4,200	98.8	1.2

In general it appears from this table that private stations employ steam engines with a greater horse power capacity than do municipal stations, practically all of the latter containing engines with a capacity of not over 500-horse power. In addition to the engines shown there are reported for the private and municipal stations, 165 gas engines having a capacity of 12,181-horse power, and 365 auxiliary steam engines having a capacity of 14,454-horse power.

For all classes of stations 1,390 water wheels are reported in operation. Of this number, 113, all but 1 of which are operated under private ownership, possess a stated capacity of 1,000-horse power and over. As in the case of steam engines, the smaller size of water wheels predominates, and wheels having each a stated capacity of 500-horse power and under form 85.4 per cent. of the total number installed. Their horse power, however, forms only 39.7 per cent. of the total horse power. Only 8.1 per cent. of the water wheels have a stated capacity of 1,000-horse power and over, but their total stated horse power forms 47.2 per cent. of the total for all classes of water wheels.

We come now to the dynamos in central stations, 12,484 being reported of an indicated capacity of 1,624,980-horse power. The accompanying table shows their character:

Dynamos—Private and Municipal Stations, and Percentage each Class is of Total: 1902.

Variety of Dynamo.	Total.	Private Stations.	Municipal Stations.	Private Stations Per Cent.	Municipal Stations. Per Cent.
Total—					
Number.....	12,484	10,662	1,822	85.4	14.6
Horse power.....	1,624,980	1,472,996	151,984	90.6	9.4
Direct current, constant voltage—					
Number.....	3,823	3,405	418	89.1	10.9
Horse power.....	442,446	418,913	25,533	94.7	5.3
Direct current, constant amperage—					
Number.....	3,539	2,957	582	83.6	16.4
Horse power.....	195,531	157,768	37,763	80.7	19.3
Alternating and polyphase current—					
Number.....	5,122	4,300	822	84.0	16.0
Horse power.....	987,003	896,315	90,688	90.8	9.2

The private stations contain 85.4 per cent. of all dynamos, and their horse power forms 90.6 per cent. of the total horse power of dynamos of every description. The showing of alternating and polyphase apparatus may be regarded as remarkable.

In addition to the equipment shown in the foregoing table, there are employed in the central stations 193 boosters, with a capacity of 17,911-horse power, and 132 rotaries, with a capacity of 63,817-horse power. As to sub-station apparatus, the number and horse power of storage battery cells, transformers, rotary converters and miscellaneous equipment in sub-stations were required to be reported separately. The totals are summarized in the following table:

Sub-station Equipment—Private and Municipal Stations: 1902.

	Total.		Private Stations.		Municipal Stations.	
Kind of Equipment.	Number.	Horse Power.	Number.	Horse Power.	Number.	Horse Power.
Storage battery cells.	8,388	25,284	8,388	25,284	..	....
Transformers.....	2,525	450,667	2,490	419,368	35	1,299
Rotary converters ...	163	85,556	162	85,546	1	10
Miscellaneous	140	21,443	135	21,269	5	174

In addition to the 8,388 storage battery cells in sub-stations, with a capacity of 25,284-horse power, there are 6,881 cells, with a capacity of 16,355-horse power, reported for the main power plants, making the number of cells for all classes of storage batteries 15,269, with a capacity of 41,639-horse power. It will, of course, be understood that the capacity of the storage batteries cannot be taken in definite horse power, that depending so much on the rate of discharge; but the figures here given are such as are justified by the reports from the central stations as to battery output of current, although it was not found feasible to reduce this to horse power hours, the rate of discharge varying somewhat indefinitely.

In addition to the 2,525 transformers in sub-stations, with an indicated capacity of 420,667-horse power, there are 207,151 on consumers' circuits, with a total capacity of 922,774-horse power, making an aggregate of 209,676 transformers, with a capacity of 1,343,441-horse power. The miscellaneous equipment consists largely of motor generator sets and boosters.

Some difficulty was naturally experienced in getting at the output, especially with plants carrying chiefly an arc light load, or unchecked by consumption meters. There were reported, however, 582,689 consumers' meters, of which 98.7 per cent. were electro-mechanical, the others being chemical. Each station was required to report its kilowatt-hour average per day and the total for the year, and also the horse power of the current average per day and the total for the year. In the majority of the stations no record is kept of the output of current, and the amounts reported are largely estimates based on the voltage and amperage of the machines with reference to the hours of operation. The average kilowatt-hour output of current per day for all stations is 6,814,074, and the total for the year 2,453,502,652. The horse power hours of current, average per day, is 9,097,796, and the total for the year 3,270,162,309. The stations operated under private ownership report 92 per cent., and those under municipal control only 8 per cent of the total kilowatt and horse power hours of current. The total dynamo capacity of central stations is 1,624,980-horse power, or, roughly, about 1,200,000 kw. As the average kilowatt-hour output of current per day is shown to be 6,814,074, it appears from this that the electric light stations are on a basis of average daily operation for 6 hours, or, approximately, 25 per cent. of their possible capacity of production of current. As the gross earnings from operation are shown to be slightly over $84,000,000, and the total production of current for the year to be 2,453,502,652 kilowatt-hours, it appears that the earnings per kilowatt-hour are not quite 4 cents. On the other hand, it is not to be understood that the central stations are able to sell all the current that they produce, as the inevitable losses between the switchboard and the consumers' lamps and motors reduce the apparent earning capacity very seriously. But even if only half the current reported as produced were consumed and paid for and the other half were lost, the yield per kilowatt-hour would appear to be not in excess of from 7½ to 8 cents.

(To be Concluded.)

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Dec. 10th., 1903.

Some Slot Meter Stories.—A Good Object Lesson.—Extended Use of Incandescent Gas.—Some Advertising.

An individual who was caught in the act of appropriating cash from a slot meter in London, the drawer of which he had opened with a master key, raised the ingenious defence that he was not stealing, but only borrowing the money, and that he should not be treated as a prisoner but as a debtor. A new state of society would be inaugurated if this was sound law. The man who entered a shop and emptied the till in the absence of the proprietor would be in the same category as one who negotiates a loan, and the necessity for protection against compulsory borrowing would become very real. Apart from the question of borrowing the money, with evidently no intention of giving a receipt for it, a very unsafe state of affairs is indicated if there is no offence against the law in opening other people's locks with the aid of a master key, an article which is not on sale in the ordinary way, and must have been obtained by some discreditable process. The point of this incident is that it elicited a pronouncement from the magistrate to the effect that money was delivered to the company when placed in the slot, and that, as far as the court was concerned, the prisoner had committed a criminal offence. This opinion is valuable as disposing of the idea that money in the slot meter cash box is in a sort of limbo and does not belong to anybody. It has been argued that the consumer parts ownership at the time of putting in, and that the company do not acquire until the act of taking out. Common sense requires that there must be a definite act of transfer from one party to the other, and further, that putting in the money constitutes such transfer. The utmost that the consumer can be expected to do is to exercise proper care as regards protecting the appliance from abuse or injury, and if anything further is required the period of responsibility should be limited, say, to 1 month or 2 months. For several reasons it is better for the company to accept the insertion of the coin as payment and to adopt short period collections and every other reasonable precaution against dishonesty. Another story comes from Wales, where a thrifty consumer utilized the slot meter as a savings bank by using silver 2-shilling pieces instead of the customary "copper," with the result that when the box was cleared there was a considerable sum to be returned to him. Such confidence in the honesty of the gas company is touching. No doubt it is a compliment, but it is also extremely inconvenient. If for no other reason it is likely to encourage the operations of "borrowers." The third point I have to notice is the right of gas companies to supply meter fittings, etc., and to recover rent for the same in the form of an increased charge per 1,000 cubic feet of gas used, which has been called in question by a critic who suggests that the additional charge should be collected as a separate payment. From an academical point much may be urged in favor of this view. But the answer to such arguments is that the inclusive payment is preferred by both parties on the score of simplicity and convenience. The inclusive payment is the distinctive and the favorite feature of the slot meter system.

A paper read by Mr. A. E. Mottram, of Ossett, at a recent meeting of the Manchester District Institution of Gas Engineers, under the title of "Why Corporations and Companies Should Undertake Internal Fitting Work," is one of the neatest presentments of the case for the affirmative that I have ever yet met with, and until an equally well written case to the contrary is forthcoming, I shall continue to hold a strong view to the same effect as that so well expressed by Mr. Mottram. In these days of petroleum, electricity, blue gas and goodness knows what, one is almost forced to blush over the admission that such a paper should be necessary. When we find handsome petroleum lamps sold far below cost, the tradesmen looking in the direction of a regular customer for oil as a means of covering the deficiency, and electric light companies offering to lay on wires and lamps absolutely free of cost, it goes without saying that the control of the supply up to the burner is an absolute necessity, unless the rival agents are to be allowed a walk over. Those who have competition to meet require no rousing up, and, therefore, the special value of Mr. Mottram's paper is in the direction of rousing those who have not, and leading them to appreciate the advantages of developing their resources and acquiring a strong position that will enable them to defy competition. On the principle that an ounce of fact is worth a bushel of theory, let us note what Mr. Mottram has to tell. He laid a mile of main, passing 120 homes, in the expectation of securing several customers. The result was—one! The houses were not piped and no one seemed inclined to go to the expense. As one customer per mile was not a profitable ratio, he turned his attention to the question of supplying fittings on the slot system. A scheme was prepared and advertised in the local paper—only once. The next week an advertisement, "Respectable gasfitters wanted, used to iron and compo.," etc., took its place. In a year the list of customers had increased 25 per cent., and the additions included 114 out of the 120 houses above referred to. He secured a good increase of rental, a larger consumption per mile of main, turned unprofitable streets into good ones, spread efficient fittings all over the district and advertised a good light in every part. The new customers included residents of 20 years' standing, who either would not or could not incur the initial outlay for fittings and, therefore, would not have gas at all unless they could have it on easy payment terms. Examples of the 120 house incident are to be found in almost every district. The first part only in places where the consumers are left to the tender mercies of the local plumber—only an odd customer here and there, who has been led to take gas because he or some of his relatives are interested in gas or gasfittings; and the second part in places where Mr. Mottram's lead has been followed, by the introduction of a competently drawn scheme, not for giving fittings away, but for placing them on remunerative terms, though without initial cost. The story of the 120 should be well digested by all interested in the sale of gas. It is scarcely too much to say that in every district of 10,000 customers who have provided their own fittings, there is a second 10,000 to be secured by the medium of a well matured inclusive payment system.

The numerous extensions in the use of incandescent gas burners that have been made this season include some buildings of historical interest. The well known Eddystone lighthouse has been fitted with a powerful system in duplicate, so that if one set fails another will be ready to fall back upon. The new light is a great advance upon the oil lamps previously in use, both as regards brilliancy and penetrating power. At this season of the year the deficiency of arc electric lights in these respects, as shown by their utter uselessness in foggy weather, and the superior properties of incandescent gas burners under such circumstances, which have been fully recognized and commented upon in the daily press, may possibly have attracted the attention of the Trinity House brethren and led up to the result above instanced. Be that as it may, the advantages afforded by the incandescent mantle, either with or without the use of compressed air, as a means of meeting any demand for a powerful light center for lighthouses or other similar purposes, are so obvious that they cannot fail to escape recognition. The Trinity House brethren are somewhat slow and conservative in their movements, and do not take to any new thing without first thoroughly proving it; and, therefore, the fact that they have selected gas for such an important position in the English Channel is the more valuable as a testimonial in its favor. Another building no less interesting in historical associations is Canterbury Cathedral. A special stand erected in the nave for the performance of an oratorio was lighted by 4 clusters, each comprising 3 No. 4 Kern burners and appliances of a similar description were fitted throughout the nave. The result was so satisfactory that the Dean and Chapter decided to retain the burners already fixed and to extend the system throughout the whole of the edifice including the choir. In the body of the nave there are 83-armed brackets, each of which has been fitted with No. 3 Kern burners, 24 in all; on the steps leading to the choir 2 No. 4 Kern burners fixed on the existing standards; some 50 No 4 Kern burners will be fixed in the choir, the existing standards being utilized, and brackets provided in addition; a bracket carrying 3 No. 4 Kern burners has been fixed in the east transept, and a 700-candle Lucas lamp in the entrance yard. The whole has been carried out under the superintendence of Mr. Page and Mr. Donaldson, the Engineer and Outdoor Superintendent, respectively, of the Canterbury Gas Company, and a special reason for congratulating these gentlemen is that the question of adopting electricity has been seriously considered by the Cathedral authorities. It should be mentioned that all the burners are fitted with plain, obscured or sand-blasted globes, as specially recommended and manufactured by the Welsbach Company for church lighting. In my own district nearly the whole of the places of worship are lighted by this system, fitted by the Gas Company without disturbing existing fittings and maintained at a moderate charge. The satisfaction expressed with the excellence of the light is only equalled by that excited by the smallness of the quarterly bills. A large building efficiently lighted by 50 or more Kern burners presents a spectacle that requires a great deal to beat it. Another important extension is in connection with the London Board Schools. At the last weekly meeting of the School Board the Works' Committee reported that they had decided to provide incandescent burners in future to all new schools, as well as in cases of addition or enlargement, and in any room in the old portion of a school where the lighting was altered.

I may conclude this letter with one or two neat little advertisement devices. The first comes from Mr. Taylor, Manager of the Shanklin gas works, and is a small card printed in two colors, showing by means of diagrams the comparative light furnished by sixpennyworth of gas and electricity. Doubting Thomas's have the option of applying at the gas works for detailed proof. Then Mr. Tyndall, of New Mallow, issues a handbill showing how much light can be obtained from 1,000 cubic feet of gas, how much heat and how much power. From this it appears that the consumer of that quantity may recover its value in the form of a 55-candle power light burning for 333 hours, or as 2 hours daily use (every burner lighted) of a medium size family cooker, or for warming a large room for 50 hours, or for driving a 1-horse power engine for 66 hours. Mr. Tyndall might have added the quantity of water that can be raised to 120° by means of that quantity of gas. Many businesses require large supplies of hot water, and in the majority of cases gas will be the fuel selected if its advantages are properly known and appreciated. Mr. F. W. Cross, of Lea Bridge, gets at his customers by means of printed dialogues embodying plain statements of fact and dealing with matters of general interest in an informative manner. The novelty in form is certainly likely to catch the attention of the reader, and may secure a perusal where other means fail. Amongst the subjects dealt with are "Complaints," "Pressure," "The Meter," "Selection of a Cooker," "Cost of Gas and Electricity," and "Shop Window Lighting." These endeavors should go a long way towards putting down ignorance and error.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. JOHN CABOT, writing to us from Hoboken, N. J., under date of the 21st inst., among other things, says: "We have built a one-story brick shop, and with our large storage yards are well prepared to take care of our increased business. This year has been our largest on record, and the prospect is good for even a better return for 1904." Of course, Mr. Cabot is known the world over as the proprietor of the company that puts out "Trays of all Kinds for Gas Works."

MR. B. F. BULLOCK, formerly in the service of the Morristown (N. J.) Gas Light Company, has been employed by Mr. Joseph Schreiber, to look after his interests in connection with the proposed gas plant for Highlandtown, a suburb of Baltimore, Md.

THE Loomis-Pettibone Gas Machinery Company, of New York, informs us that branch offices have been opened, as follows, in the named places: Boston, Mass., State Mutual Building; Pittsburg, Pa., Farmers' Bank Building; Chicago, First National Bank Building.

MR. WM. HOBSON VOLLMER, Assistant Manager of the New Orleans (La.) Lighting Company, retires from its service January 1st, as a result of the position heretofore held by him having been abolished. Mr. Vollmer rendered the Company good and effective service.

A CORRESPONDENT incloses the following: "Mr. Stephen Calvert Ford, who for 30 years occupied the position of United States Inspector of Gas and Meters for the District of Columbia, died the evening of the 10th inst., at his residence, 1309 Q Street, Northwest, Washington, of debility due to advancing years. Mr. Ford was born in Carlisle, Pa., June 29, 1839. Carlisle, Pa., was not, however, the family seat of the Fords, and his parents were in Pennsylvania only temporarily at the time. Shortly thereafter they returned to their home at Leonardtown, St. Mary county, Md., where the ancestors of the Maryland Fords settled in 1692. In the old court house at Leonardtown the records show the will of the head of the house of Ford, who died soon after settling in America. The will was probated in 1700. Mr. Ford was educated in Georgetown University. He showed marked talent as a chemist, and soon after graduating established a drug business on Pennsylvania avenue. He was married in 1860 to Miss Anna Le Compte, a descendant of the Le Comptes who settled on the Eastern Shore in 1644. Because of his ability as a chemist Mr. Ford was appointed in 1873 Inspector of Gas and Meters by President Grant, a position he held until January last. He was frequently consulted by European and American chemists in regard to matters which he alone seemed to have mastered thoroughly. During his 30 years' service he was absent from his office but ten days from illness. Commissioner Macfarland, in his last report to the President, spoke of Mr. Ford's services in the highest terms of praise. He was distantly related to the Calverts, members of the house of Baltimore and that of Ford having at one time intermarried. For the past year he had been in failing health. He leaves a widow, two sons (Wm. L. Ford, the lawyer, and J. Lee C. Ford of the Geological Survey, who returned from Montana a few weeks before the death of his father), and two daughters, Mary V. and Rosa A. Ford. The funeral took place the morning of the 14th inst. at 10 o'clock from St. Paul's Church, Fifteenth and V Streets Northwest. Interment was in Mount Olivet Cemetery."

THE authorities of Elkhart, Ind., have granted an extension of the franchise of the Elkhart Gas Light and Coke Company that will make it operative until January 1, 1934. The original franchise, which was issued in 1871, was for a term of 50 years.

MR. ROBERT A. WEIDENMAN has been appointed receiver of the Haverstraw (N. Y.) Gas, Fuel and Light Company. The receiver is now Manager of the Company, and the proceedings are brought in an amicable way to determine what the bonded issues of the Company fairly represent. The Haverstraw property is becoming more valuable every day from the standpoint of the gas seller.

MR. VINAL, President of the Cambridge (Mass.) Gas Light Company, asserts, with the knowledge back of the assertion that his saying is perfectly true, that his Company is not to be absorbed by the Massachusetts Gas Company.

AT the last meeting of the Board of Directors of the Cincinnati Gas and Electric Company, held the 17th inst., Mr. Norman G. Kenan, the Company's President, gave a detailed review of the output of gas, the consumption of electricity, and the gross and net earnings of the Company for the year up to date, which showed conclusively that at the end of the Company's fiscal year next spring there will be left after the payment of all dividends and fixed charges a large sum for a surplus fund. This will be a remarkable showing in view of the fact that at the last annual meeting there was a deficit of about $65,000. For the past month the net earnings of the Company amounted to $26,000 over November of 1902. The report of Mr. Kenan to the Directors came as a most pleasant surprise, as they did not anticipate that the Company's business was in such a prosperous condition. The Company continues to increase its output of gas. On Wednesday of this week the increased gas output over the corresponding date last year was 1,268,000 cubic feet, and yesterday it was 1,500,000 cubic feet, which makes yesterday the record in gas output for the Company. Up to and including Tuesday the increased output of gas for December, as compared with the first 15 days of December last year, was 10,966,000 cubic feet. During the first 15 days of this month the Company had applications for 170 new gas connections, as compared with 61 for the same period last year. There was sold thus far this month 117 gas ranges; none last year There have been secured 106 new electric light consumers, who will use 3,395 incandescent lamps. The Company has now 417,785 incandescent lamps in use, as compared with 344,776 this time last year, being an increase of 21 per cent."

THE new equipment of the Appleton (Wis.) Gas and Electric Company—it is of the coal gas type—is more than answering the promises of its constructors and the belief of its purchasers.

THE Waxahachie (Tex.) Gas and Electric Company has been incorporated by Messrs. J. F. Strickland, O. Goodwin, W. C. Ross, M. B. Templeton and R. Vickery. It is capitalized in $100,000.

MR. CHARLES H. QUACKENBUSH has been appointed Superintendent of the gas division of the properties of the Merion and Radnor (Pa.) Gas and Electric Company.

A RECENT issue of the St. Louis *Republic* says that Messrs. Green, Rumsey, Blackford and Clark, all of St. Louis, are now in complete control of the Sedalia Gas and Fuel Company, the Sedalia Light and Power Company and the Sedalia Water and Light Company, all of Sedalia, Mo. The interests have been consolidated for joint operation.

AT a recent meeting of the Greenville (Tex.) City Council the franchise granted some time ago to the projectors of the Greenville Electric Light and Gas Company was declared forfeited.

A CORRESPONDENT incloses the following: "Although Julius Marquardt, of North Bergen, N. J., thought he was injured to the extent of $10,000 through being nearly asphyxiated by escaping illuminating gas at his former home on Hamblet Place, Dec. 3, 1900, the jury in the circuit court that listened to the evidence in the trial of his suit against the Hudson County Gas Company concluded that 6 cents would compensate him and accordingly returned a verdict in that amount. Marquardt claimed that his 3 children as well had been half suffocated by the gas which escaped from pipes on which the defendant Company's employees had been at work the day before. The defence produced proof that their men had not turned on the gas before leaving and insisted that some member of the Marquardt family must have done it"

THE Waco (Tex.) Gas Company, in submitting a proposition for the lighting of that city's streets by electric arcs, proposed the following rates: Minimum number lamps, 150, 5-year contract, $110 per lamp per annum; 10-year contract, $100 each; 15-year contract, $90 each.

THE Court of Appeals, Kentucky, has granted the Calor Oil and Gas Company the right to work under certain leases owned by it in what is known as the Meade county natural gas field. The Calor Company is controlled by the Louisville Gas Company, and the latter proposes to supply natural gas in that city as soon as the needed pipe lines can be put down.

"W. A.," under date of the 10th inst., says: "The final payment having been made to the shareholders of the old San Francisco Gas Light Company, it is next on the cards that this corporation will be

(*Continued on page* 1014.)

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO., PROPRIETORS.

MONDAY, DECEMBER 28, 1903.

(*Concluded from page* 1013.)

dissolved in short order. The final distribution of capital to shareholders will be made early in January at the rate of $3.35 per share, amounting to $350,000. At the time of a merger with the Edison Company, each holder of the San Francisco Gas Company having received share for share of the Gas Light Company's stock, a Company formed with 100,000 shares of a par value of $3 each to hold certain real estate which was turned over to the combination. In January, 1901, a dividend of 36 cents was paid; September, 1902, 36 cents; January, 1903, 90 cents; June, 1903, $1.50, all of which, with the present amount, makes a return of $6.47 per share."

A CORRESPONDENT in Clinton, Mass., forwards the following: "The local Gas Light Company, at its electric system on Parker street, is under the direction of Superintendent R. M. McKenzie, making a number of improvements which the Company promises will be to the advantage of the local users of electricity. By the installation of a new generator at the Parker street plant there will be provided a 2-phase alternating current, which will make it possible to sell electricity for power and which will also provide a practically continuous service day and night, so that electricity can be used in places where heretofore it has not been possible so to do."

THE plant for the supply of gas to the Chicago Heights (Ills.) district will be completed by February 1st.

THE offices of the Fall River (Mass.) Gas Works Company are to be removed from the Anthony building to spacious, beautifully fitted and well-located rooms in the Bennett building.

MR. H. S. WILLIAMS, of Sarnia, Can., has accepted an important position with the Guelph (Can.) Company.

JUDGE JAMES M. BARKER, of the Supreme Court of Massachusetts and General Morris Schaff of the Massachusetts Board of Gas and Electric Light Commissioners, have been appointed by the Trustees of the Berkshire Athaenaeum to draft resolutions to the memory of the late Mr. William R. Plunkett, formerly prominent in the ownership and management of the Pittsfield (Mass.) Coal Gas Company.

CONTROL in the Westerly (R. I.) Gas and Electric Company has passed into the hands of the Westerly and Hopkinton Railway Company.

THE regular quarterly dividend of 2 per cent. on the shares of the New Haven (Conn.) Gas Light Company is payable the 1st prox.

THE officers of the Consolidated Gas and Electric Company, of Salisbury, Md., are: President, W. P. Jackson; Vice President, W. J. Downing; Treasurer, M. A. Humphreys; Secretary, W. S. Gordy, Jr.

THE plant of the Traverse City (Mich.) Gas Company was only completed a year ago, but so great has been the increase in the business under the supervision of Mr. Thomas A. Bates, who has been in charge, that extensions have had to be made constantly. The increase in the output of gas has been 51 per cent. during the year. The total improvements in extensions have amounted to $5,700 during the year, as follows: Addition to mains system, value, $1,500. Additions to service system, value, $2,250. Meters added, 185; value, $1,950.

The Market for Gas Securities.

The optimists had it all their own way in respect of trading in local gas shares. Consolidated sold as high as 196¾, and closed to-day (Friday) at 195½ to 196¼, which figures show a gain of virtually 7 points for the week. The causes which impelled this movement are as patent as those that prevailed 3 months ago, when the stock was selling well under 170. No more stable, solvent corporation than the Consolidated Gas Company is doing business in America to-day, and those who buy it at anything under 200 cannot fail of at least a 4 per cent. investment while they hold it, no matter how long they may live.

Brooklyn Union crossed the 210 line, but its mark in the near future will be something considerably higher. Peoples Gas, of Chicago, continues to move along towards a higher level, without jerky movements. Keep your eyes on it. Some wiseacres declare that the electric interests of the Windy City would like to join forces with the gas men. Let us hope the union will not be accomplished. Baltimore Consolidated is unchanged, and Cincinnati Gas and Electric is virtually at the par mark. A sale at auction of 606 shares of Detroit City Gas (to close out a loan) was made this week at $35 per share. It is worth much more.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

DECEMBER 28.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$78,177,000	100	195	196¼
Central Union, Bonds, 5's.	3,000,000	1,000	104	106
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan	658,000	..	108	112
Mutual	3,500,000	100	260	300
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co. ..				
Bonds, 5's	11,000,000	1,000	103	105
Northern Union, Bonds, 5's.	1,250,000	1,000	105	106¼
New York and East River				
Bonds 1st 5's	3,500,000	1,000	102	106
" 1st Con. 5's	1,500,000	..	109	111
Standard	5,000,000	100	135	140
Preferred	5,000,000	100	155	170
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	180	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	207	215
" " Bonds (5's)	15 000,000	1,000	118	115
Bay State	50,000,000	50	⅛	¼
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works...	450,000	100	28	30
" 1st Mtg. 5's	500,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	6⅛	8
" " Bonds, 5's	5,250,000	1,000	73	76
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co..	29,500,000	100	97½	98
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	101	101½
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¾	89¼
Preferred	3,026,500	100	107⅞	109
Consumers, Jersey City Bonds	600,000	1,000	100	102
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore...	11,000,000	100	..	59½
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	86	90
Consolidated G. & E. Co.'s.				
Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	99¼	100
Detroit Gas Co., 5's	982,000	1,000	71	73
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	85	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104¼	105
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	50	65
" Bonds, 6's	2,650,000	..	103¼	106½
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	79	90
Preferred	2,500,000	100	..	100
Bonds	10,000,000	1,000	109¼	110
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	135	140
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	107½	108¼
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	184¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¾
New Haven	1,000,000	25	250	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	98⅝	98⅞
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	15,800,000	100	67	67¼
St. Joseph Gas Co.				
" 1st Mtg. 5's	751,000	1,000	92	96½
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's..	2,465,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	46	48
Bonds	2,047,000	1,000	94	96
Washington, D. C	2,600,000	20	280	287½
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., Dec. 9, 1903.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Jan. 15th, 1904, to stockholders of record at the close of business, Dec. 31, 1903. Checks will be mailed.

1488-5 LEWIS LILLIE, Treasurer.

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GAS ENGINEER,

Energetic and fully acquainted with modern systems of making coal gas, horizontal as well as inclined, is open for engagement. Can construct, build and operate works, with guarantee of highest and best results. Address,

1490-3 "PROGRESS," care this Journal.

SITUATION WANTED

As Manager or Superintendent of a Water Gas Plant,

By a man 44 years old. Has made good showing in developing new business. Is at present with plant putting out 350,000,000 yearly. Address, "A. B.,"

1484-tf Care this Journal.

CORRESPONDENCE WANTED

With Gas Company Desiring the Services of a Practical Gas Man and Business Man,

To take full charge of business, or superintendent of manufacturing, distribution and soliciting for new business. Prefers town where business needs working up through the proper pushing of gas arcs, gas stoves and other gas appliances. Will be open for an engagement Jan. 1. First-class references as to ability, character and responsibility

1489-2 Address, "E. D. J.," care this Journal.

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Experienced Man Wants Position as Manager or Superintendent of Coal Gas Property.

Single man, 30 years of age, with 10 years' experience and first-class references. Address, "COAL GAS,"

1489-tf Care this Journal.

Wanted Position.

Having disposed of my interest in the works I am now managing, would like a position with some gas and electric light company as manager. Have never made a failure of any works I have managed.

1490-tf Address, "W T.," care this Journal.

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Of 10,000 inhabitants, operating four benches of 6's, half-depth regenerative type. Must be thoroughly competent to get best results from benches and be capable of handling men.

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A High-Class, Experienced Gas Stove Salesman,

Who has an acquaintance with the purchasing agents of gas companies.

Address, RATHBONE, SARD & CO.,
1490-2 Albany, N. Y.

WILL SHORTLY BE WANTED,

An Energetic Manager for Small Gas Works,

355,000,000 cubic feet per annum. Must have had experience in coal and water gas plants and be able to do gasfitting, and a hustler for business. Apply to "J. R.," stating age, wages required to start, and experience,

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NOTICE.

I would like to get in communication with parties who have

GAS PROPERTIES

to sell. Am in position to pay cash. Address,

1490-4 "BUYER," care this Journal.

FOR SALE.

One Set of Lowe System Water Gas Apparatus.

Second-hand. For details write to the

DOVER GAS LIGHT COMPANY,
1485-tf DOVER, DEL.

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Built entirely of Pure Copper Cold Drawn.
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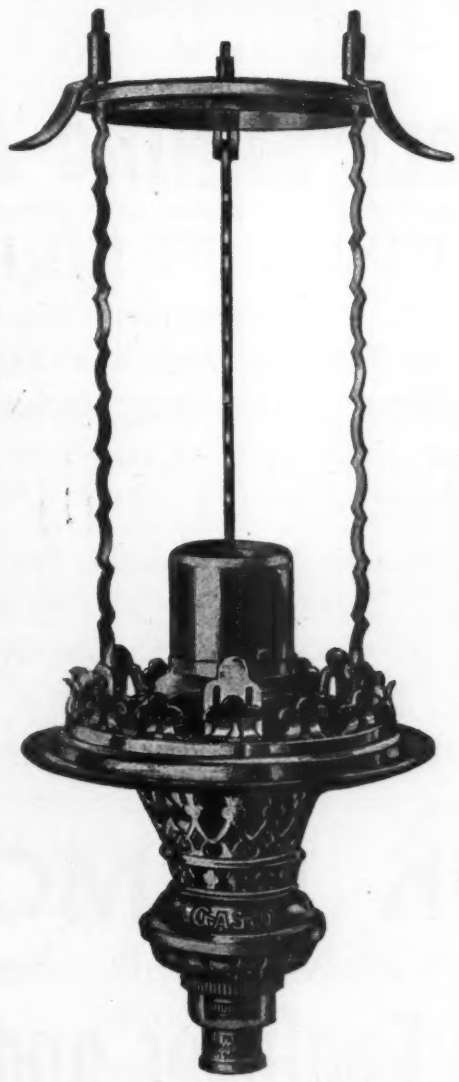

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They Sell For
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Estimates Furnished on any kind of Work in Connection with Gas or Water Plants.

SPECIAL ATTENTION GIVEN TO THE REMODELLING AND EXTENDING OF THE PROPERTIES OF WORKS NOT UP-TO-DATE.

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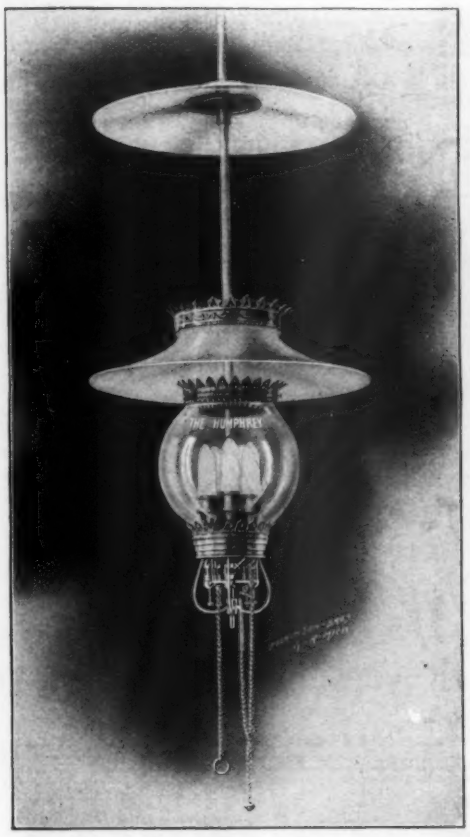

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1418-tf

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Church's Patent Trays.

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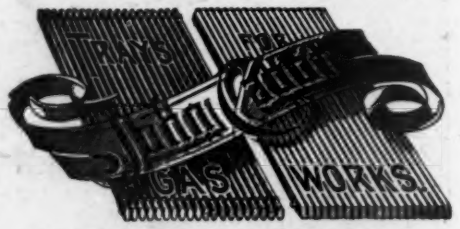

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We also Supply the Chapest and Strongest
•Reversible Bolted Trays•
IN THE MARKET.
SEND FOR BOOKLET AND CIRCULARS.

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Can be made into up-to-date prepays by putting on the Reeves attachments. Gas companies' own workmen can attach them to either old or new meters. The Reeves is THE attachment, the one that gives no trouble after it is put on. Has important features possessed by no other device of the kind. Long warning to consumers. Simple. Can't be "beaten." Large coin capacity. Low price. Use prepays and reduce your collection expenses and losses. Order ahead, as we are rushed.

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To any Gas Company, on request, I will send a 6-lb. package of **TRIPP'S NON-RUSTING PIPE LUBRICANT,** unexcelled for Gas, Steam and Water Pipe Joint Threads. (You pay express charges only.)

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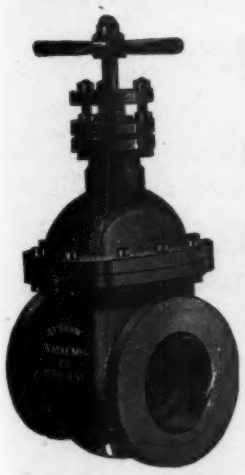

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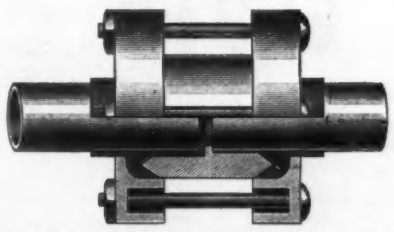

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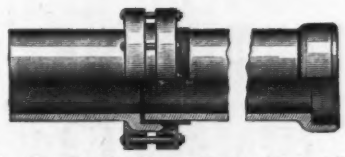

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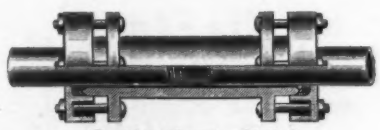

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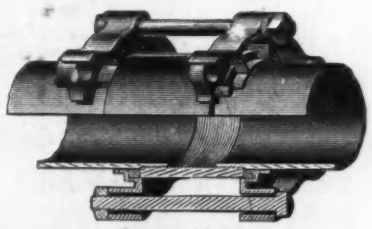
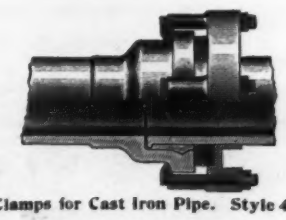


Clamp. Style 4.



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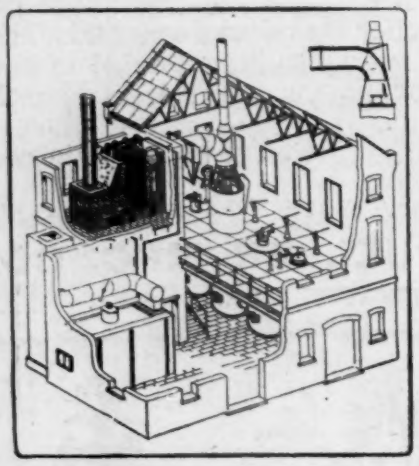

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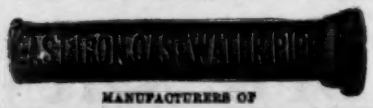

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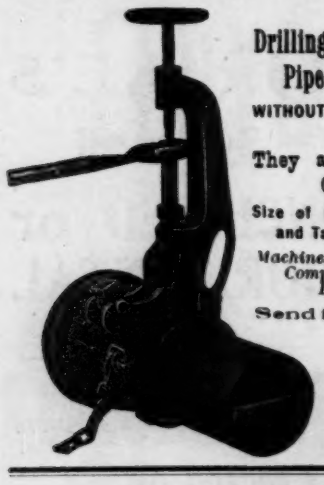

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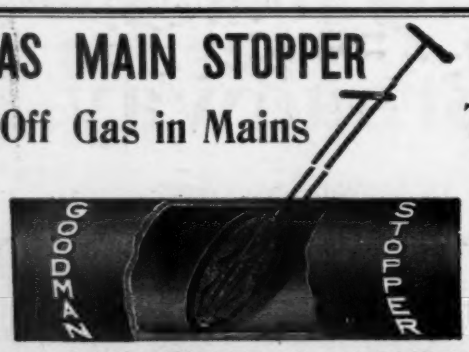

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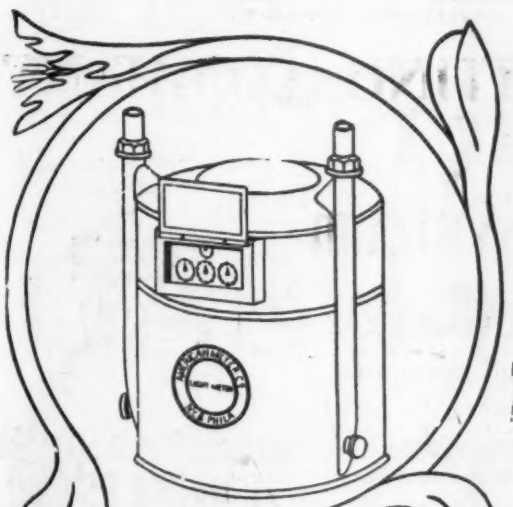
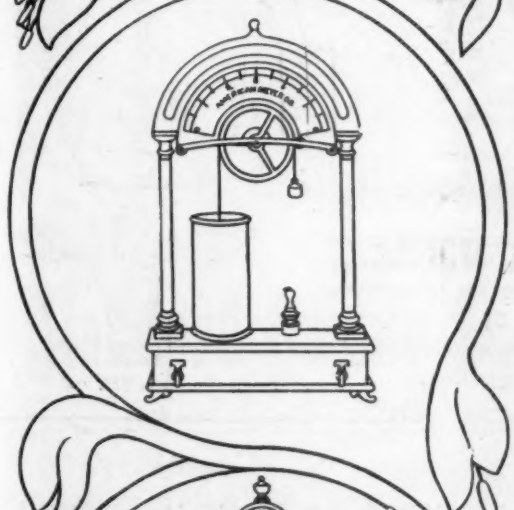
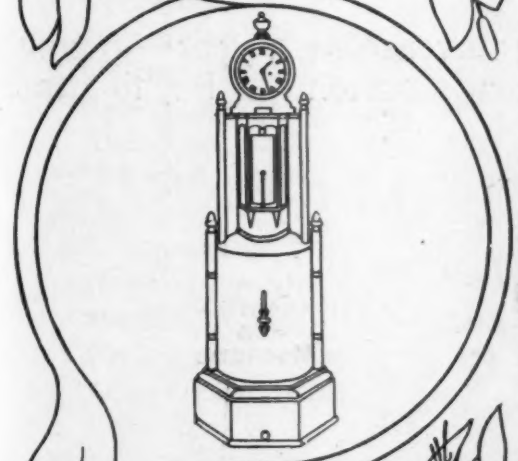






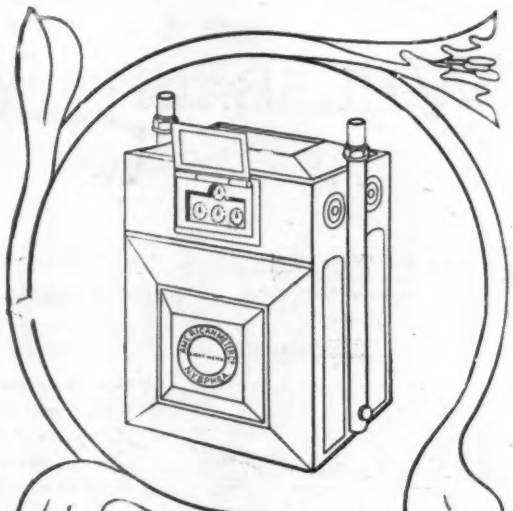
PUBLIC LIGHTING TABLE.

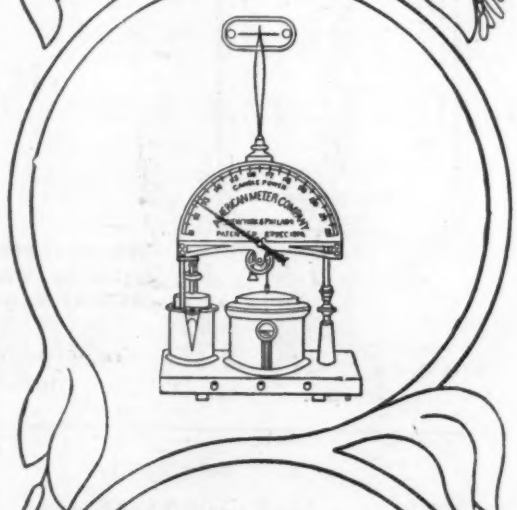
JANUARY, 1904.

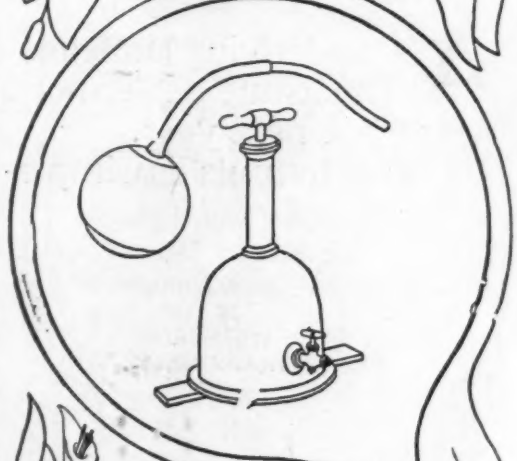
Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Fri.	1	No L.	No L.	4.30	6.30
Sat.	2	No L. FM	No L.	4.30	6.30
Sun.	3	No L.	No L.	4.30	6.30
Mon.	4	5.20 PM	7.50 PM	4.30	6.30
Tue.	5	5.20	9.00	4.30	6.30
Wed.	6	5.20	10.20	4.30	6.30
Thu.	7	5.20	11.30	4.30	6.30
Fri.	8	5.20	12.30 AM	4.40	6.30
Sat.	9	5.20 LQ	1.40	4.40	6.30
Sun.	10	5.30	2.40	4.40	6.30
Mon.	11	5.30	3.40	4.40	6.30
Tue.	12	5.30	4.40	4.40	6.30
Wed.	13	5.30	5.30	4.40	6.30
Thu.	14	5.30	6.20	4.40	6.30
Fri.	15	5.30	6.20	4.50	6.25
Sat.	16	5.30	6.20	4.50	6.25
Sun.	17	5.30 NM	6.20	4.50	6.25
Mon.	18	5.30	6.20	4.50	6.25
Tue.	19	5.30	6.20	4.50	6.25
Wed.	20	5.30	6.20	4.50	6.25
Thu.	21	5.30	6.20	4.50	6.25
Fri.	22	9.00	6.20	5.00	6.25
Sat.	23	10.00	6.20	5.00	6.25
Sun.	24	11.00	6.10	5.00	6.25
Mon.	25	11.50 FQ	6.10	5.00	6.25
Tue.	26	1.00 AM	6.10	5.00	6.25
Wed.	27	2.00	6.10	5.00	6.25
Thu.	28	3.00	6.10	5.00	6.25
Fri.	29	4.00	6.10	5.05	6.15
Sat.	30	5.00	6.10	5.05	6.15
Sun.	31	No L.	No L.	5.05	6.15

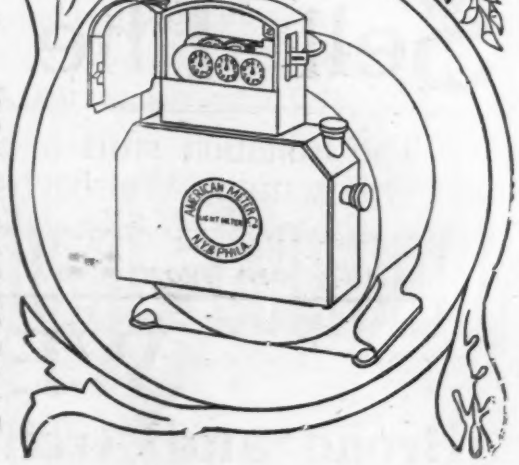
TOTAL HOURS LIGHTING DURING 1904.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	225.00	January	423.20
February	205.40	February	367.40
March	187.40	March	355.35
April	169.50	April	298.50
May	152.30	May	264.50
June	137.20	June	234.25
July	138.50	July	243.45
August	151.00	August	280.25
September	164.40	September	321.15
October	191.30	October	374.30
November	210.30	November	401.40
December	237.10	December	433.45
Total, yr.	2171.40	Total, yr.	4000.00









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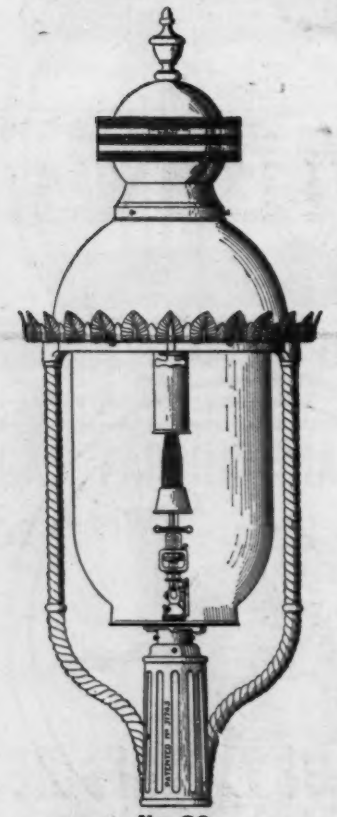
.... OF AMERICA ....



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Winsted, Conn.	Boone, Ia.	Easton, Pa.
Canon City, Col.	Pueblo, Col.	Lawrence, Mass.
Schenectady, N. Y.	Charlotte, N. C.	Council Bluffs, Ia.
Hagerstown, Pa.	Fall River, Mass.	Chattanooga, Tenn.
Malden, Mass.	Duluth, Minn.	Tuckerton, N. J.
Bridgeport, Conn.	New York (Mutual Co.)	Springfield, O.
Albert Lea, Minn.	Waltham, Mass.	Easton, Pa. (2d contract).
Brooklyn, N. Y.	Dover, Del.	Mobile, Ala.

TOTAL DAILY SETS TO OCTOBER 15, 1903, ... 55
TOTAL DAILY CAPACITY, ... 56,600,000 cubic feet.
TOTAL SETS TO DATE, ... 502
TOTAL DAILY CAPACITY, ... 356,280,090 cubic feet.

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Established 1858. Incorporated 1890.
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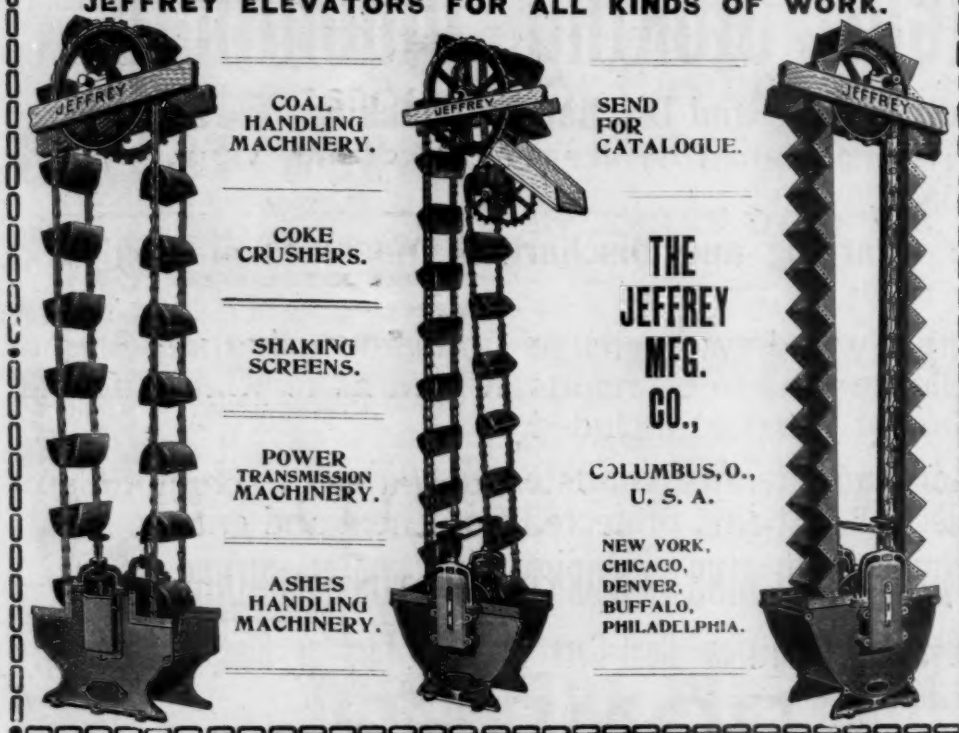

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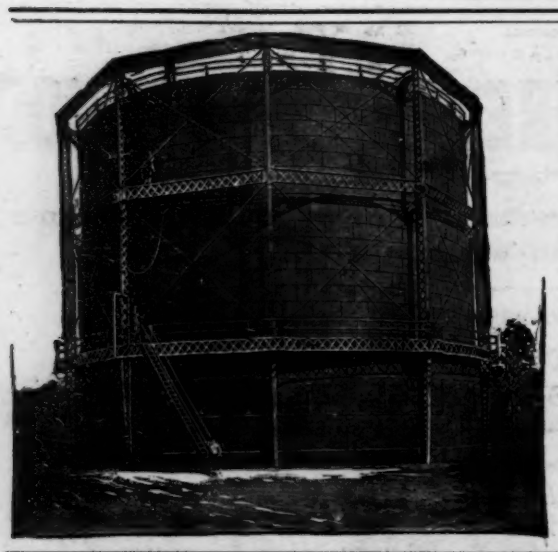

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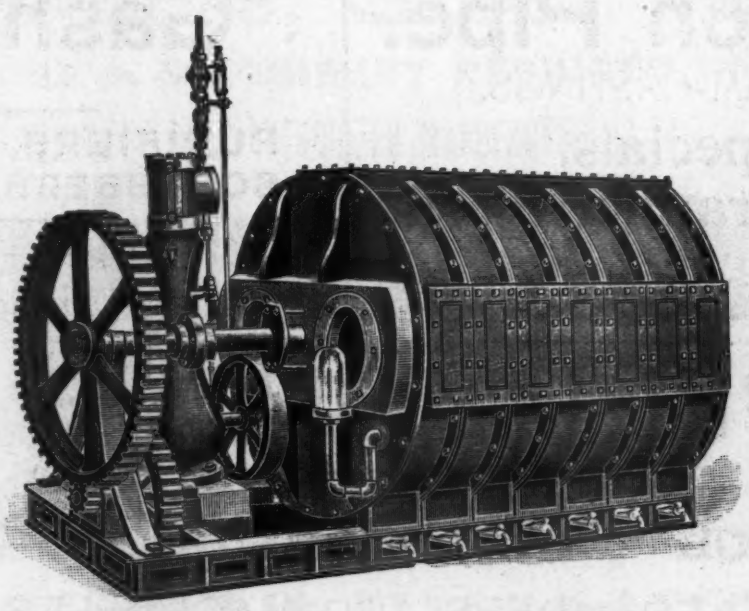

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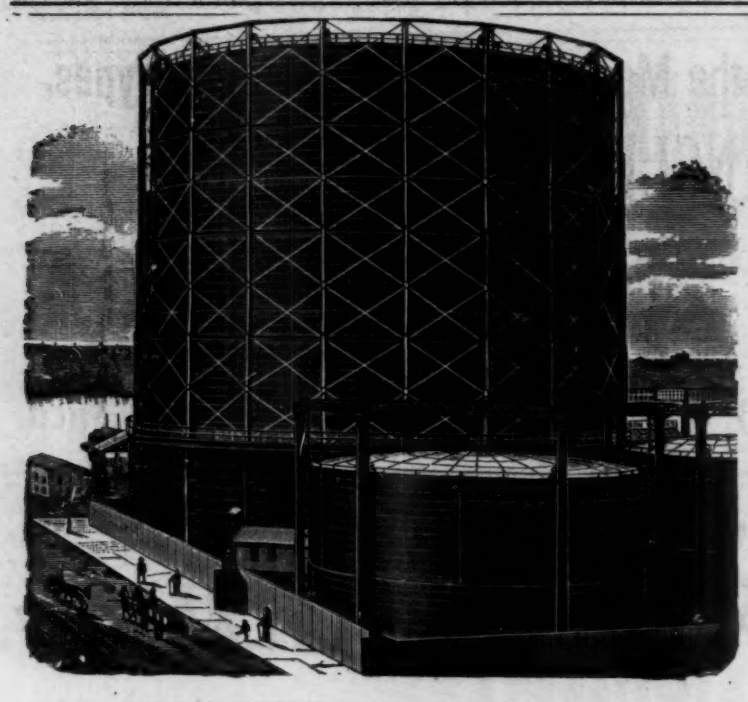

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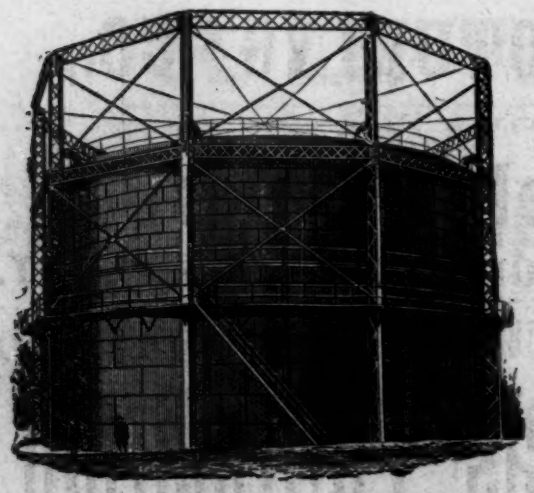

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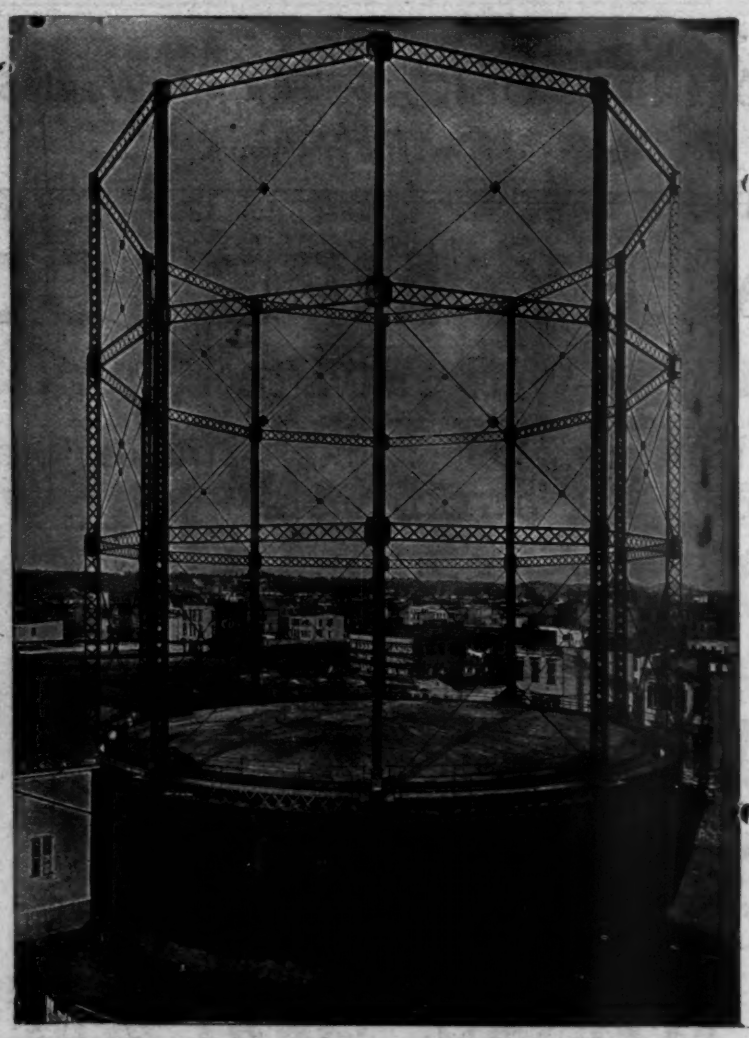

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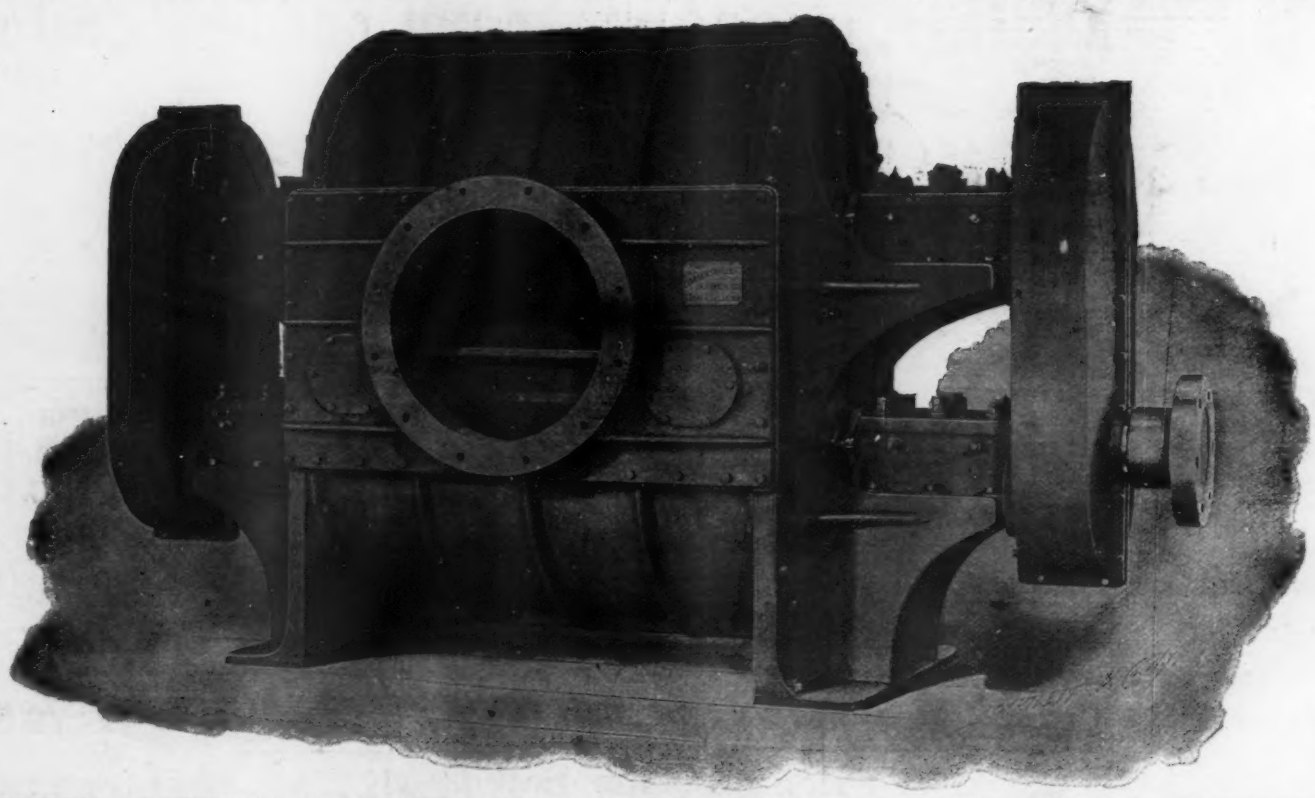

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